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Per. G.A. Wilts 8° 62

REPORT

OF THE

MARLBOROUGH COLLEGE

Natural History Society,

FOR THE

HALF-YEAR,

ENDING MIDSUMMER, 1871.

"TUM MIHI NATURÆ LIBEAT PERDISCERE MORES:
QUIS DEUS HANC MUNDI TEMPERET ARTE DOMUM."

MARLBOROUGH:
PRINTED BY C. PERKINS, TIMES OFFICE.
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PREFACE.

"SELF PRAISE" (as our copy-books told us long ago) is no recommendation;" but we think we may be pardoned if on the present occasion we give way to this failing. The Natural History Society has indeed had many causes of self-congratulation during the past half-year. We have no intention of writing a lengthy introduction to a report so well filled with other matter, but in accordance with our usual practice we purpose touching on some of the most prominent features of the last few months, in order that we may (if we fail in aught else) furnish a spur and incentive for renewed exertion during the coming half.

I.—Last half the Society was able to boast a larger number of members than at any previous stage of its existence. This did much towards destroying the false colours under which the Society long sailed in the eyes of the outer world. Formerly it was not unusual for a popular paper to draw over a hundred auditors, of whom there were six visitors to one member: whereas, in consequence of the new rule, those who witnessed the large audiences which on more than one occasion assembled in the Museum last half, had the satisfaction of feeling that at least one half were members or associates of the Society.

II.—The Botanical Garden which was started last half in the corner of the Wilderness, thanks to the energy of the President and his coadjutors has fully realised the hopes of its originators. If it proves as useful to science as it promises to be picturesque to the eye, we may augur rich fruits for the Natural History of the future.

III.—The Society amongst its other labours has republished the interesting lecture of Marlborough's Arnold, Bishop Cotton, on the "Antiquities of Marlborough." Apart from the interest which attaches to the slightest memorial of that "magnum et venerabile nomen," the Lecture is characterized by the keen shrewdness and quiet humour for which its author was celebrated.

IV.—Turning to a different subject, we may observe that the expenses of last half were considerable, and nearly absorbed the reserve fund which was at the disposal of the Society. It was resolved, therefore, last half that the subscriptions of future honorary members should be raised; that existing honorary members should have the option of voluntarily paying the raised subscription; and that members should resign the right which they have hitherto enjoyed of receiving a report for nothing.

V.—For this number the further instalment of the new edition of the Marlborough Flora has been postponed: in the next number it will probably be continued. At present the botanical notices appear in the usual form.

VI.—As to the various sections, we must confess that the work done in them has scarcely been as energetic and successful as it might have been and should have been. The lists are not so full as we could have wished, and the attendance has often been meagre. It is of course a mistaken policy to be too exacting and we do not wish to scare away intending members by too awful a picture of the duties which are incumbent on them. At the same time an institution like the Natural History Society cannot be maintained without some small quota of self-devotion, some small fragment of self-denial: and it is in the hope of eliciting this that we have pronounced the above criticism. If members will ask themselves, we think they will find that at a very small sacrifice they may greatly increase the Society's efficiency.

VII.—As to the papers we have the same remark to make. We fully allow that many members are held back from writing papers by the most praiseworthy motives. They feel certain of failure, and they shrink from reflecting their own unworthiness on the Society at large. They believe that outside critics will regard them as representative spokesmen, and will argue from the incapacity of individual members to the ignorance of the collective body. We can assure them that this is a wholly erroneous idea, that failure is the indispensable ingredient of success, and that, if the Society is worth anything at all, it is strong enough to outlive many unsuccessful papers from incompetent pens.

In conclusion, we need only add that the one field day which the Society has celebrated was most successful; that science has now begun to form part of the School curriculum, and that we may therefore look forward to the infusion of new blood into the Society; lastly, that Gregory, of Russell Street, has agreed to come yearly in order to arrange the geological specimens in the Museum.

We cannot close without tendering our thanks to all who have been in any degree instrumental in furthering the welfare of the Society; to the President, Secretary, and Committee for their unflagging exertions; to the members for their interest in the papers and the meetings; to the visitors for their sympathetic applause; to the butterflies for allowing themselves to be caught; and to the birds for permitting themselves to be plundered of their eggs with considerable equanimity. We would fain hope that we pen these lines on the threshold of a half destined to be at least as successful as the last.

LIST OF MEMBERS.

PRESIDENT:
Rev. T. A. Preston.

SECRETARY:
W. D. Fenning.

TREASURER:
E. Meyrick.

LIBRARIAN:
H. J. Verrall.

COMMITTEE:

The Ex-officio Members
C. M. Bull, Esq.
A. C. Champneys
J. B. Fuller

HONORARY MEMBERS:

Rev. G. G. Bradley	W. H. Macdonald, Esq.	D. E. Leighton, Esq.
Rev. F. W. Farrar, F.R.S.	J. F. Duthie, Esq.	W. W. Fowler, Esq.
A. Armstrong, Esq.	G. H. Dawson, Esq.	M. H. Smith, Esq.
H. M. Moule, Esq.	S. Image, Esq.	J. F. Cornish, Esq.
F. E. Thompson, Esq.	A. C. Almack, Esq.	C. Sankey, Esq.
W. E. Mullins, Esq.	E. F. im Thurn, Esq.	A. H. Beesly, Esq.
C. M. Bull, Esq.	G. K. Mills, Esq.	F. E. Hulme, Esq., F.L.S.
Rev. J. F. Bright	R. W. Taylor, Esq.	Capt. H. O. Bateman
Rev. J. Sowerby	W. Mansell, Esq.	Rev. C. E. Thorpe
Rev. H. Bell	Rev. G. W. De Lisle	Rev. J. S. Thomas
Rev. C. W. Tayler	H. A. Evans, Esq.	C. A. Sladen, Esq.
A. Babington, Esq.	Rev. J. W. Mills	G. E. Manisty, Esq.
W. Fergus, Esq., M.D.	E. C. Sewell, Esq.	W. Kooh, Esq.
E. J. Turner, Esq.	J. Walker, Esq., M.D.	W. P. Sellick, Esq.
S. B. Dixon, Esq., F.G.S.	A. C. Hilton, Esq.	H. C. Spry, Esq.
F. Storr, Esq.	F. Giles, Esq.	W. D. Smith, Esq.

MEMBERS:

J. B. Oakeley
*J. B. Fuller
*E. L. Hesketh
H. S. Sankey
W. D. Fenning
*H. J. Verrall
P. L. Hesketh
J. H. R. Clark
G. C. Mansel
*A. C. Champneys
E. Meyrick
G. H. Perry
W. J. Gardner
H. O. Yeatman
W. C. Adams
R. W. Doyne
C. E. Vaughan
J. P. Morgan
J. F. Thomas
W. Maud
E. A. Jackson
A. J. Spencer
F. P. Lefroy
M. A. Chilton
E. Millais
F. W. Toms
F. W. Giles
G. J. B. Buckley
W. H. Dobie
N. Loring
J. B. Kite
A. P. Macgregor
A. S. Hopper
A. H. G. Skrine
A. L. W. Colville
R. Armitage
J. W. Dudding
J. C. Pierson
H. C. Tillard
H. H. Phear
E. Hunter

* Heads of Sections.

ASSOCIATES:

W. H. Payne-Smith
W. Goodchild
H. W. Simpkinson
F. J. H. Jenkinson
G. D. Faber
J. W. Hockin
R. St. J. Boddington
H. B. Jeffreys
H. Tennyson
H. M. Hamilton

RULES.

1.—That this Society be called the Marlborough College Natural History Society.

Constitution.

2.—That the Society consist of Members, Honorary Members, and Associates.

Officers.

3.—That the Officers of the Society consist of a President, Secretary, Treasurer, and Librarian, to be elected from and by Members of the Society.

Election of Officers.

4.—That those Members of the Committee, who are not ex-officio Members, be elected half-yearly, and that the retiring Members be eligible for re-election.

5.—That the same rule apply to the Librarian and Treasurer.

6.—That each candidate for election give in his name to the President, any time before the day of election.

7.—That all canvassing for votes by a Candidate, or by his friends with his knowledge, shall at once disqualify him for any election that half-year.

8.—That any member canvassing for votes for a Candidate, or for a new rule, forfeit the right to vote on any occasion during that half-year.

9.—That the election shall take place at a meeting held as soon as possible after the return of the School, the old officers remaining in office, until the fresh elections are held.

10.—That eight Honorary Members have the power of debarring a candidate, from standing for any office.

Management.

11.—That the affairs of the Society be conducted by a Committee, consisting of the President, Secretary, and three other Members of the Society, to be elected from and by Members of the Society; three of whom shall form a Quorum.

President.

12.—That in case of an equality of votes, the President shall have a double or casting vote.

13.—That in the absence of the President, the Committee be empowered to request any Member of the Society to take the chair.

Committee.

14.—That on the occurrence of any election, each Member of the Committee have double the number of votes of any other Member of the Society.

Secretary.

15.—That the duties of the Secretary be to keep a list of all the Members of the Society, and of all former Members and Benefactors who may wish to receive the Reports of the Society; to summon meetings (when necessary) of the Society; to keep a detailed report of the proceedings, as well as lists of Members and Visitors present at each meeting, and generally to act under the direction of the Committee in all matters connected with the welfare of the Society.

16.—That in the absence of the Secretary from any meeting of the Society, minutes of the proceedings be taken by a member of the Committee, appointed by the President.

Treasurer.

17.—That the duties of the Treasurer be to collect all sums of money due to the Society; to receive all donations of money; and to disburse all sums payable by the Society out of the funds entrusted to him.

18.—That the Treasurer furnish half-yearly a detailed account of the receipts and disbursements to be audited by the Committee.

19.—That the funds of the Society be placed in the College Bank, and that no money be withdrawn by the Treasurer without the signature of the President to the order; or in his absence, that of the Secretary.

Librarian.

20.—That the duties of the Librarian be to keep a catalogue of the Library, with the names of the Donors; to see that the Library Regulations are carried into effect; to be responsible for the order of the Museum, and when necessary to assist the Secretary in the distribution of the Reports of the Society.

Library.

21.—That any Member of the Society be at liberty to consult any of the books belonging to the Society, but that only certain volumes, to be decided on by the Committee, be allowed to be taken from the room.

22.—That if any Member wishes to take a volume from the Museum, he shall give his name, and the name of the book, to the Librarian, who shall enter them in the book kept for the purpose.

23.—That every volume so taken out be returned by the end of the quarter, but that no book be kept more than one month.

24.—That if any volume be damaged, such damage shall be reported by the Librarian to the Committee, who shall decide upon any further proceeding in the matter.

Museum.

25.—That any Member of a section, who is not a member of the Society, be allowed access to the Museum at such times as it is open to Members of the Society generally, provided he first obtain leave from the President, which leave shall be renewed every quarter, but may be taken away at any time, if the privileges be abused in any manner.

26.—That the same privileges be extended, under the same conditions, to such other Members of the School who may wish to use the Library and Collections for the purposes of study, provided there be a reasonable excuse for their not belonging to a section.

27.—That in all cases the Museum be used for the study of Natural History alone, and not as an ordinary Reading Room, except on Sundays.

Botanical Garden.

28.—That the Garden be under the complete control of the President, or of some person appointed by the President.

29.—That the Garden be open to Members of the Society, at all times, except on Sundays, but not to Visitors.

30.—That any Member on application to the President can have the charge of a bed.

31.—That no plants be put in without special leave from the President.

32.—That Members may keep any plants of their own in such places as the President shall appoint, as long as the ground is not required.

33.—That the Society's flowers may not be picked.

34.—That Members may gather from their own plants, but may not depute others to do so.

Members.

35.—That the election of new Members rest entirely with the Committee.

36.—That every Member pay a half-yearly subscription of 2s. 6d., to be paid at the first meeting of the Society in that half-year.

37.—That if a Member be elected at, or after the Quarter, he shall only pay 1s. on Election.

38.—That Members have the right to be present, to state their opinions, and to vote at all general meetings of the Society; to introduce a visitor at all general meetings of the Society; to have personal access to the Museum at all times; and to introduce a visitor at such times, as shall seem fit to the Committee.

Honorary Members.

39.—That Honorary Members have all the privileges of Members, except the power of introducing a member of the School to the meetings of the Society.

40.—That Honorary Members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

41.—That Honorary Members may compound for all future subscriptions by the payment of a sum of two guineas.

Associates.

42.—That Associates be confined to members of the VIth or Upper Vth Forms; that they pay 1s. 6d. a half-year, and be entitled to the use of the Museum, and to attend the meetings of the Society whenever they think fit, but shall not be entitled to vote on any question, to introduce a visitor, or to take books out of the Museum.

Visitors.

43.—That on such occasions when the number of those who wish to be present as visitors at the general meetings of the Society is greater than the number of Members who attend, the President and Committee shall be empowered to admit two or more each, as shall seem fit.

Suspension of Members.

44.—That any Member be liable to be excluded from the Society by the Committee, if in their opinion, he shall have failed to shew sufficient energy in the working of the Society.

Sections.

45.—That sections be formed for the more accurate study of the different branches of Natural History, and that the Heads of these sections be chosen by the Committee half-yearly from Members of the Society.

46.—That these sections shall hold meetings as often as shall seem fit to the Heads of the several sections, at which any Members of the school, with the sanction of the Head of that section, may attend.

Meetings.

47.—That ordinary meetings of the Society be held once a fortnight, but that the Secretary be empowered to call extraordinary meetings when necessary.

New Rules.

48.—That any Member of the Society have power to propose any new rule or any alteration in an old one, provided the motion be seconded by another Member.

MEETING HELD FEBRUARY 17TH, 1871.

THIS was a meeting to discuss certain rules proposed by A. C. Champneys, and seconded by C. E. Vaughan.

There were 20 persons present: 1 Hon. Member, 19 Members.

MEETING HELD FEBRUARY 21ST, 1871.

THE following rules, proposed and discussed at the previous meeting, were carried in the following shape:—

1.—That those Members of the Committee, who are not *ex-officio* Members, be elected half-yearly, and that the retiring Members be eligible for re-election.

2.—That the same rule apply to the Librarian and Treasurer.

3.—That each Candidate for Election give in his name to the President any time *before* the day of election.

4.—That all canvassing for votes by a Candidate, or by his friends with his knowledge, shall at once disqualify him for any election that half-year.

5.—That any Member canvassing for votes for a Candidate, or for a new rule, shall forfeit the right to vote on any occasion during that half-year.

6.—That the election shall take place at a meeting held as soon as possible after the return of the school, the old officers remaining in office until the election of the new officers takes place.

7.—That eight Honorary Members have the power of debarring a Candidate from standing for any office.

There were 18 persons present: 3 Hon. Members, and 15 Members.

MEETING HELD FEBRUARY 24TH, 1871.

THE following donations were announced, and thanks ordered to be given to the Donors:—

Ornithology.—Egg of Emu, presented by D. F. Grant Dalton, Esq. Eggs of Great Bustard, Bee-eater, &c., from Spain, by E. S. Preston. Eggs of Gulls, &c., from Scotland, by H. B. Jeffreys.

Geology.—Coprolite and Jaw of Icthyosaurus, from Whitby, fossil Fern and tooth of Elephant, the latter from Cromer, presented by the Rev. F. W. Farrar, F.R.S. Two fossil Ammonites from Whitby, by G. Nares.

Archæology.—Flint implements from Acheul and Denmark, by the Rev. F. W. Farrar, F.R.S.

Various.—An Idol from Delhi, presented by J. F. Thomas. Assignat for 500 livres of the First French Republic, by L. Tracey. A fine specimen of coral, by F. E. Hulme, Esq., F.L.S. The first Report of the Cheltenham Natural History Society, by the Society. Various Periodicals and Transactions of Societies, by the Rev. J. M. Fuller, F. E. Hulme, Esq., F. L. S., and J. Britten, Esq., F.L.S.

There were also exhibited a variety of the Blackbird, a Pintail Duck, and a Widgeon, purchased by the Society; a Red-legged Partridge, shot at Ogbourne, and a Green Sandpiper, lent by Mr. Parker; and a stick carved by a French prisoner, exhibited by F. Storr, Esq.

F. Storr, Esq., then gave an account of a trip to Germany.

In accordance with the rule recently passed, the Half-yearly Election of Officers then took place. C. M. Bull, Esq., A. C. Champneys, and J. B. Fuller were elected on the Committee; E. Meyrick, Treasurer; and H. J. Verrall, Librarian.

The Rev. F. W. Farrar, F.R.S., and W. P. Sellick, Esq., were elected Honorary Members.

There were 41 persons present: 6 Hon. Members (including the Master), 18 Members, and 17 Visitors.

MEETING HELD MARCH 7TH, 1871.

THIS was a private meeting to consider the following new Rules, which were passed:—

1.—Amendment to Rule xxv.

Instead of the words "to have personal access to, and to introduce a visitor to the Museum," shall be substituted "to have personal access to the

Museum at all times, and to introduce a visitor at such times as shall seem fit to the Committee."

It was decided that for the present the times of introducing visitors shall be from 12.15 to 1.30 p.m. on Mondays and Wednesdays, and between tea and preparation on other days.

2.—"That a new Class of Members be elected, to be called Associates, and to be confined to Members of the Sixth and Upper Fifth Forms. They shall pay 1s. 6d. a half-year, and shall be entitled to the use of the Museum, and to attend the meetings of the Society whenever they think fit, but shall not be entitled to a copy of the Half-yearly Report, to vote on any question, to introduce a visitor, or to take books out of the Museum."

The President announced that the College authorities had granted a plot of ground to the Society for the purpose of a botanical garden, for which a special vote of thanks to the Bursar was unanimously passed.

There were 16 persons present: 1 Hon. Member and 15 Members.

MEETING HELD MARCH 10TH, 1871.

THE minutes of the previous meetings were read and confirmed.

The President announced that H. C. Spry, Esq., had been elected an Honorary Member; W. Maud, E. A. Jackson, A. J. Spencer, F. P. Lefroy, M. A. Chilton, E. Millais, C. W. Haughton, and F. W. Toms had been elected Members; and W. H. Payne-Smith, H. W. Simpkinson, F. J. H. Jenkinson, G. D. Faber, J. W. Hookin, H. Tennyson and H. M. Hamilton had been elected Associates.

A letter from J. E. Ollivant, Esq., was read, correcting some errors in the account of some of his donations to Society, given in the last Report. On page 10, the "College Lantern" is the first *School* periodical published at Utah. On page 19, "the highest inhabited point" ought to be "the highest railway station in the world, viz., Sherman, in the Black Mountains." On page 41, "plants from New Zealand," ought to be "from South and West Australia."

Entomology.—J. B. Fuller passed round a list of notices recorded since the beginning of the half-year.—The President exhibited a handsome case of Insects, &c., presented by the Rev. F. W. Farrar, F.R.S., among which were a leaf Insect (*Phyllium Scythes*), Lantern Fly (*Fulgora laternaria*), Praying Mantis (*Mantis sublobata*), Stick Insect (*Phibalosoma le*

Peletierii), Bird-killing Spider (*Mygale aviculare*), Diamond Beetle (*Entimus imperialis*), Flying Dragon (*Draco Volans*), &c.

Ornithology.—E. L. Hesketh exhibited some Birds' Eggs presented by the Rev. F. W. Farrar, F.R.S., among which were those of the Hawfinch, Goat-sucker, Nightingale, &c.

Botany.—The President announced that about 25 species of plants were in flower, a smaller number than usual at this time of the year: and exhibited a collection of Austrian Willows and a Monograph of the genus *Cladonia*, belonging to the order of Lichens, presented by Rev. F. W. Farrar, F.R.S.

Library—H. Verrall announced the donation of "A Spring Tour in Portugal," by the Author, the Rev. A. C. Smith; Swainson's Conchology, and Mrs. Lane Clarke's "British Seaweeds," presented by F. E. Hulme, Esq., F.L.S. He also called attention to the cases provided for the different periodicals, twelve in number, taken in by or presented to the Society.

The following paper, written by G. E. Manisty, Esq., was then read, on

"ADAM AND THE ADAMITE,"

By D. M'Causland, Q.C., L.L.D.

THE object of this book is to show that human beings existed on this earth *before Adam*. To some this may seem merely a strange theory, others may think it opposed to all religion. That it is strange, when first heard of, cannot be denied; but it must be borne in mind that very many things which seem strange are nevertheless true. Strangeness therefore does not imply unreality. It is very natural that just at the first glance the statement that there were Pre-Adamites should appear profane, and for this reason, that it appears to contradict the Bible. But upon further inquiry it will be seen that the statement is not contradicted by Scripture, and therefore that it is not profane. One of these two things is inevitable: either men must believe that the account of the Creation in Genesis admits of being understood otherwise than it has been generally, or else hundreds, or rather thousands, must be confessed to be atheists, or at least not to believe the Bible in the particular part referring to the Creation. This question may not directly bear upon the subject of Pre-Adamites, but it does so indirectly, in that persons think that to maintain the existence of human beings previous to Adam, and to hold that the world was created long before that time, both imply an unbelief in the Bible. The purpose of this paper is to show that the Bible does not contradict the former supposition, and before entering upon that I would try to show that the belief in the Creation of the world long, long

before Adam is also compatible with a belief in the Bible. Thousands of geologists, convinced by what they see before them in the rocks forming the earth's crust; many ethnologists unable to account for the phenomena of races by the common belief that all human beings have sprung from Adam and Eve; and many philologists, forced to confess that the languages of the world denote that mankind has been produced not from one pair of parents only, but from several; all these cannot but believe that the world has been formed, and that man has existed for thousands of years before the creation of Adam. Are all these men to be marked with the badge of atheism, now so readily bestowed by the enemies of science? Is knowledge, which has been divinely given to man, to be branded as an evil gift? Perhaps some might argue that "a little knowledge is a dangerous thing," and that but little comparatively can ever be attained by man. But this is no argument in reality: of course a little knowledge is *dangerous*, and why? because it may be misused. In the same way wealth, talents, even many virtues may be misused, and therefore they are *dangerous*; but neither they nor a little knowledge are in themselves *bad*. There is a wide difference, and they who try to prove that knowledge is merely dangerous, are trying to prove what requires no proof, but is an undeniable fact. Why is it that persons are considered atheists for believing the world to have been in existence more than 6000 years? It is because men have generally adopted an explanation of the account in Genesis which limits the time of the whole creation to 6000 years ago. But it is merely that they have *adopted* one explanation; there are two in this, as in most passages, and why should not the other be the right one? As long as there was no reason for believing the world to be more than 6000 years old, the explanation which was first given was retained. Now that there are very strong grounds for believing the contrary, the second explanation should be admitted. If it were in reality, as it appears to be at first sight, opposed to the Bible, I can say most seriously and earnestly, that I should not for one moment entertain this view, much less should I bring it before you. But the knowledge that many scientific men fix the creation of the world earlier than the commonly received time, and the fear that some of you as students of science may come to discard the Scripture account as generally explained, without substituting any belief in its stead, it is this that has induced me to present this subject for your consideration. I must ask you before we enter upon it to make up your minds to retain perfect faith in the Bible, and only to be prepared to understand it in a sense in which you may not have regarded it before. We must shake off not religion, but only our preconceptions of this one part of Scripture. With regard, first, to the formation of the world long before Adam. If you read the first chapter of Genesis carefully with a view to understanding this point, you will see that a

very short and concise account is given of the Creation, as if merely intended as a preface to the creation of Adam. A very noticeable fact is, that the order of the creation of the animal world is just that which is seen in the rocks, so that Scripture and geology, as might naturally be expected, are in perfect agreement. The only apparent difficulty is the use of the word "day," seeming to indicate that the Creation only occupied six days. It is unnecessary to tell you who are members of the Natural History Society, that geology proves incontestably that the mere formation of the earth's crust must have occupied countless ages. We are therefore probably to understand the word "day" here as denoting not our day of twenty-four hours, but merely as a general expression for "period." The Scriptural account of the Creation will then be seen to accord with what we see and with what our senses compel us to believe: those who try to prove the fallacy of the Bible by proving that it contradicts all science, will thus find that they have undertaken an impossibility.

As the subject is probably new to most of my hearers, and as many arguments are new also, it will be the simpler plan just to give a short outline of what we are going to discuss. As we are not going to gallop through a sensation novel, it will not take away all the interest if we know what is coming. The object, then, of the book from which this paper is taken, is to prove that Adam was not the first man upon our planet, but that there were others long before his creation. The arguments in favour of this, or rather some of the arguments, are that the book of Genesis nowhere says that there were no human beings before Adam, but only that he was the first man *in God's image*. To this we shall return in the course of the paper. There are many arguments in support of this. Thus, it seems impossible to account for the diversity of races now upon the earth without adopting the supposition that each race has been descended from distinct pairs of progenitors. This may seem very wonderful, but it cannot well appear more incredible than that black children should have been born of white parents. According to the latter theory, we must not be surprised any morning, perhaps in to-morrow's *Times*, to see that a green, or perhaps purple, or possibly a patched green and yellow child has been born. But that is not all: the new little monster must live, and, marvellous coincidence! another just like it must be born, as Eve was made for Adam, and these two will then be the ancestors of a race of patched green and yellow men, and very picturesque they will look. Again, there are proofs furnished by geology and archæology that the earth has been inhabited at periods many centuries before the creation of Adam. In all these arguments we shall see the meaning more clearly if we just bear in mind that the general drift of them is to prove the great antiquity of the earth and of the first primeval inhabitants, and also to prove that all human beings cannot have

sprung from Adam, and that therefore Adam was not created first. I shall now adhere closely to the book "Adam and the Adamite," not adding consciously anything of my own that differs from the original, nor, I hope, omitting anything of importance.

The arguments in support of this theory—viz., that human beings were created before Adam,—are drawn from *five* sources, not including Scripture. These are (I) Geology, (II) Archæology, (III) History, (IV) Language, (V) Ethnology.

(I). *Geology* gives most weighty evidence that the earth was in a state of formation for an incalculable time before it assumed its present features, and that after that it was inhabited by mankind for ages and countless ages before the time that has generally been regarded as the first appearance of mankind. The order of creation is discernible in the rocks which form the crust of the earth, where the remains of extinct beings are found in a fossil state. The order, then, is from animals of lower to those of higher creation, from creatures without eyes or ears, fish, frogs, beetles, on to birds, then mammals, as the lion, hyæna, &c., and finally, *man*. Thus geology does not contradict, it supports Scripture. Now when it is borne in mind that the strata of the earth's crust are many thousands of feet thick, and that often one foot denotes changes which must have been spread over hundreds of years, some general notion may be formed of the antiquity of *the earth*. Two proofs may be sufficient, though there are many more, to demonstrate the antiquity of *man*. (1). In beds of gravel, found in France and England, arrow-heads, knives, &c., of *flint* are found, very rudely wrought. With these occur in the gravel the bones of animals now extinct, such as certain species of the elephant and rhinoceros. The species are everywhere extinct now, which shows that a long time has probably elapsed since these animals were living. Further, both the bones and the flint implements are twenty feet below the surface, *i.e.*, sufficient time has elapsed since the elephant and rhinoceros lived in France and England for the deposit of 20 feet of gravel above their remains. As the process of deposition is very slow, the gravel beds must have been very long in a state of formation. Again, as the bones of elephants, rhinocereses, and many such animals are found in England, where did the living creatures come from? As they are also found (*i.e.* their bones) in France, it must be that France and England were once connected. Therefore time is to be allowed for the change by which the dry land has been converted into the sea, separating England and making it an island.

(2). The bone-caves which have of late excited so much interest furnish another link in the chain of evidence. In these caves flint implements, bones of extinct animals, and human bones are all mingled together, shewing beyond

a doubt that man lived as the contemporary of the extinct animals. Pieces of pottery are also found, a slight advance, as none occurs in the gravel. It is even possible to see the food upon which these ancient human beings lived, for the shells of the mussel, oyster, and other "shell-fishes" are found collected in heaps, and many bones also, probably belonging to animals taken in the chase. Thus there are very palpable proofs of the presence of men in this world at a time immeasurably distant, compared with which the time since the creation of Adam, 6000 years, is literally, as nothing. "Nothing is gained to the cause of truth by shutting our eyes to these memorials of primeval man, or by ignoring them as evidence of his existence in what has been termed the pre-human, meaning thereby, the pre-Adamite era. The fabricators of these various implements shared the soil of France, Belgium, and the British Isles with the mammoth, rhinoceros, hippopotamus, cave-bear, lion, hyena, and various other bovine, equine, and cervine animals now extinct. They lived when the reindeer and Irish elk stalked through the land. Some of these species of extinct mammalia may have lived into the Adamite period; but what geologist will be found to contend that all of them could have been tenants of any part of Europe within the last six thousand years?"

Archæology.—This may be said to be the complement of Geology, indeed the two are almost one. (1.) In Denmark peat bogs occur, in the superficial parts of which remains of *beech*-trees are found; below these, *oaks*, and still lower down *pines*. In the pine layers *stone* implements are found, in those of the oak, *bronze*, and in those of the beech, *iron*. These stone implements show an improvement upon those found in the gravels. The beech trees have not died out yet; they were growing in the time of Julius Cæsar, and they are growing still. If then the beeches have occupied the soil so long, and they must have occupied it long, even before Julius Cæsar saw them, as they would have taken a considerable time merely to grow to the size which they had then attained, and they had died down several times probably before that, how long must the three eras combined have lasted? And that man was on the earth all that time is clearly proved by the presence of his handiwork in each of the eras, showing an improved state in each. (2.) Again in Denmark are found large heaps of oysters, mussels, &c., with the bones of animals. These mounds, called "kitchen middens," are about 10 feet high, and sometimes 1000 feet long by 200 feet broad. Fragments of pottery, flint weapons, &c., have been discovered in them, but no bronze or iron implements. The oysters, &c., are of a species which cannot now live in the Baltic because it is not salt enough, and therefore when they lived in it, the salt open ocean must have had freer access to it, probably through the peninsula of Jutland, which was once an archipelago. This implies a considerable lapse of time, for such changes in land and sea.

The domestic ox, horse, and sheep, do not occur in the kitchen middens, the human skulls differ from those of the later bronze and iron ages, in which also the domestic animals were living. (3.) The Swiss Lake dwellings are if possible more interesting than the peat bogs with their successive periods of stone, bronze, and copper, and the kitchen-middens with their vast amount of shells. Remains of the ancient wooden huts are found in the lakes of Zurich, Constance, Geneva, Neufchatel, and many others, being built upon platforms raised on piles, (like buildings of the present day in Papua and Borneo), and connected with the land by moveable causeways, thus affording safety against the sudden attacks of an enemy. This was a very necessary precaution, as it appears, for the occupants of the eastern lakes seem to have been first attacked and killed by some enemy who at the same time burnt their huts, while those of the west, if they suffered the same fate, did not do so till a long time afterwards. The ground for this supposition is, that in the eastern lakes no bronze or iron is found, but only stone; while in the western and central many bronze weapons are found. As bronze was not used until after stone, these huts must be more recent than the eastern. Plaited cloth, carbonised wheat, bones of the ox, sheep, &c., and pieces of charred timber (from which it is concluded that the huts were burned,) are abundant in the mud below the sites of the lake dwellings. A change in human life was setting in about this period; in the stone era the food consisted more of *wild* animals killed in the hunt whereas in the bronze era *domestic* animals were more eaten. A more advanced civilization was coming in from the east and advancing westwards.

8.—*History.*—It is scarcely necessary to mention that in different parts of the world different races of men exist, distinguished from each other physically and morally. There are generally said to be five types, characterised by five differently shaped skulls. It is sufficient here to make a threefold division. (1.) The *Negro* has a *narrow and elongated* head, his face and jaw-bone project greatly in advance of his forehead, (two peculiarities always found together,) his hair is woolly, and his hue black. The black colouring matter is not in the skin, but in a tissue below it, and it is not due to climate, for a cold climate does not make Negro families white, even after they have been exposed to it as much as 200 years. The Negro race in its most characteristic type is found between the tropics, in Central and Western Africa. The physical aspect of the race has been the same for at least 3300 years, as is evidenced by paintings on a tomb at Thebes, on which the figures of four Negroes are seen, differing from the Caucasians beside them just as much as they differ now. The date of the tomb is of the reign of Thotmes III, who lived about 1500 years B.C. (2.) The skull of the *Mongol*, the second type, is *broad* and *square-faced*, the breadth being about nine-tenths of the length, while the

breadth of the negro's is only about six tenths of the length. The cheek-bones are expanded *outwards*, and thus give that peculiar pyramidal head so characteristic of the Chinese and other Mongols, whereas, in the Negro the cheekbones project *forward*. (3.) The *Caucasian* holds a middle place between the Negro and the Mongol, neither having very projecting jaws and an elongated head, like the one, nor the very broad cheek-bones and broad head of the other. It is oval and symmetrical, no part being prominent. The body also of the Caucasian is better proportioned than that of any other race, he is in fact " the most perfect type of humanity upon the earth."

Such are the characteristics that distinguish the three principal varieties of mankind, and " such they have been as far back as history and tradition extend." A Caucasian is never born of Negro parents, nor a Negro of Caucasian parents. If the two races intermarry, the offspring belong to one of the races or more frequently die out, and " no hybrid race can be permanently established."

Not only are these races distinguished by *physical* differences ; they differ no less *morally*. Thus, some are civilised (the Caucasian), while others are barbarous. With regard to the latter, it is a very noticeable and remarkable fact, that not a single instance is on record, of the uncivilised savage becoming civilised without the aid of some other nation. The Peruvians and the Mexicans have both their traditions of some mysterious stranger who taught their ancestors the useful arts. This is not all : even when the first impulse has been received, barbarous races at once relapse, unless still aided step by step. They seem in fact to have no tendency to advance, to improve their state, but, if uninterfered with, always remain stationary. The Caucasian alone has a tendency to *progress*, to raise himself and to civilise others. The Chinese are an illustration ; they have always been in the same condition as at present, from time immemorial, having probably learnt what little they know from the Caucasian. It is the same with the Negro in his natural state, it is the same with all the Mongols. They must ever remain barbarous until the more enlightened Caucasian comes to their assistance.

The Caucasian (or Iranian) races extend from the Hymalayas to the Indian Ocean, including the whole of Hindustan and the Deccan, as well as Persia and Arabia ; and from the Ganges on the east, to the shores of the Atlantic, comprising the north of Africa and nearly the whole of Europe, and, at a later period, a great part of the American continent. The Negro inhabits the whole of central Africa. The Mongolian races inhabit all the north and north-east of Asia. Another variety, the American Indian, includes all the aborigines of the New World except the Esquimaux, who are Mongols. Lastly, the Malays are the natives of the peninsula of Malacca, and the Polynesia.

4.—*Language.*—By studying the various languages and dialects spoken by the various nations of the world, it is possible to discover to which of the great divisions, Caucasian, Mongolian, and Negro, they individually belong. Each step in this part of this subject seems to reveal a new wonder, each wonder more wonderful than the last. All languages are divided by philologists into *three* categories. First is the *Radical*, where each root preserves its independence, and is a word, as the Chinese. Second, the *Terminational*, where two or more roots coalesce to form a word, one of which retains its radical independence, as the other Turanian languages. Third, the *Inflectional*, in which roots so coalesce that neither of them retains its independence. This is represented by the Iranian (Caucasian) languages. The Radical, the Terminational, and the Inflexional systems are also respectively called the *Family*, *Nomad*, and *State* languages.

The *Inflectional* languages alone are *civilised*, they alone have a literature and a history. They are spoken only by Caucasians, the civilised portion of mankind. The geographical position of the nations speaking an inflectional form of language, is the region between the Turanian races on the north and east and the Negro in the south, including Europe, the north of Africa, Arabia, Persia, and Hindostan. Inflectional languages are divided into the *Semitic* and the *Japhetic*. These two, though widely differing from each other both in words and in grammar, nevertheless sufficiently resemble each other to lead philologists to conclude that they both started from the same material elements. This is equivalent to saying that the races which for thousands of years have been speaking the different languages of the Japhetic and Semitic families, were once one people, using one speech. (1) The Japhetic (Aryan, or Indo-European) family includes the Sanskrit and its modern representatives, the numerous dialects of India, the Persian, the Greek, Latin, Slavonic, Celtic, and Gothic or Teutonic, in short nearly all the languages of Europe, India, and Southern Asia. That they are derived from a common origin is plainly shown by a resemblance not only of grammatical structure, but of a large proportion of words. One instance will illustrate this: the English word "mother" is in Greek "$\mu\eta\tau\eta\rho$" (meter), in Latin "mater," in Germanic "modar," in Sanskrit "matar." Instances equally to the point might be adduced to establish the similarity of *structure* in these languages, but suffice it to say that there *is* a similarity here, as strong as between single words. This resemblance of words and grammar points back to a time when the ancestors of widely-spread nations were all together, members of one family, destined to be separated, and to originate many nations and languages. If in Sanskrit, Latin, Greek, Slavonic, and Celtic one word is found expressive of one thing, it is very evident that that thing must have been known before

the separation of Celts, Slaves, &c. Otherwise, how could they all have adopted the same word.

(2).—The Semitic languages are the Aramaic, Arabic, and Hebrew. They occupy a tract 1600 miles long, from the south of Arabia upwards, and 800 broad, from the Mediterranean eastwards. The Semitic race also inhabit the northern shores of Africa, being there the descendants of Phœnician colonists.

Though it may be said that the Caucasian languages are spoken from the Mongol on the north and east to the Negro on the south, still there are a few exceptional cases where Turanian languages are found in that region. The exceptions are the Basque Provinces in the Pyrenees, the Magyars of Hungary, the Osmanli Turks, the Nishadas of India, and a few mountainous districts in the Caucasus. The languages of the Basque Provinces and of parts of the Caucasus are left to testify that they were once the primitive languages of Spain and the regions lying about the Caucasus. Those aboriginals who spoke them were invaded by a superior race, driven back and back until they were extirpated, with the exception of a few thousands who retired to the mountain fastnesses, where they have been ever since, and where their own peculiar language is still spoken. Again, the Magyars, like the last two races, are of Turanian origin, and speak a Turanian language. They inhabited the south of the Ural mountains, and were expelled thence by the Turks, when they took refuge near the lower Danube, about 840 A.D. Lastly, the language of European Turkey is Turanian. Though by long intermixture the European Turks now resemble the Caucasian more than the Mongol, yet the whole Turkish race is Mongolian by orgin. Thus the inhabitants of the Pyrenees and the Caucasus (and the Nishadas of India) are the representatives of once widely-spread races which have been nearly extirpated. The Magyars, on the contrary, and the European Turks, are Turanians, who have invaded countries peopled by Semitic and Japhetic colonists. The original home of the people who exterminated the aboriginal occupiers of Spain and many other countries, seems to have been *Southern Asia*. Thence they gradually spread east and west, north and south, "replenishing the whole earth and subduing it." The Semitic branch migrated southward and westward, and left as records of its migration the languages of the Chaldee, the Arab, and the Hebrew, and also the Egyptian. The Japhetic or Aryan branch divided, the main stream flowing to the north-west, and peopling nearly all Europe by degrees, while another stream flowed eastward to Hindostan, where they formed the Sanskrit language, "The most complete and polished of all the languages of the earth." Sanskrit is thought to have ceased to be a living language about 400 B.C. The Japhetic family, therefore, comprises nearly all the languages of Europe, Southern Asia, and India, while the Semitic (as has been stated)

occupy an area of about 1600 miles, from the south of Arabia northwards and from the Mediterranean eastwards. The Turanian languages are spoken in northern, eastern, and central Asia, Chinese being the principal, by the races which are found in Bhotan, and Thibet, and the Deccan. It is a remarkable feature of the Turanian languages that they are more perfect in proportion as they are more distant from China, the language of which is monosyllabic. The Turanian race extended to America, the American Indians being Turanian both in language and the shape of the skull.

5.—*Ethnology.*—The world presents human beings in various degrees of civilisation and barbarism. One of two changes must have taken place. Either races now barbarous must have been once civilised equally with the rest, and have since degenerated; or, nations now civilised must have once been uncivilised, and raised themselves to their present improved state. A parallel consideration with this is, whether the Caucasian was the first of the human family on earth, or whether he was the last. If he was the first, being the only *civilised* race, as has been remarked, it follows that a retrograde movement has reduced some of the Caucasian descendants to barbarism, while others have retained their position. If, on the other hand, he was the last, if Adam was not the author of all human beings, then the barbarous races were first on the earth, and all civilisation is due to the Caucasian. The latter supposition, that there has been improvement and not retrogression in the human race is strongly supported by the general law of nature, by which the lower is always advancing to the higher. One instance of this has been given when speaking of the animal creation as shown by Geology. It may be assumed, then, that the Caucasian, the descendant of Adam, was created last of the races of man, *i.e.*, that Adam was not the originator of *all* human beings, civilised and barbarous, the Negro and the European alike. Strong evidence of this is afforded by geology. Traces of *man* have been found in rocks where they must have been deposited an inconceivably long time ago. But traces of *civilised man* have not been found in these rocks, shewing that barbarous beings lived before civilised men were on the earth. The first traces of civilisation, metallic products, occur far later than the flint weapons of the gravels and caves. The improvement of substituting metals for stone had its origin in the East, and the race with whom it originated were able to exterminate the wild aborigines of the West. Thus there is strong reasons for supposing that the world has been peopled, not from one pair of ancestors, Adam and Eve, but from several, Adam and Eve being the latest. Those who contend for the theory of one common pair of human beings from whom all others have sprung, are forced to place the cradle of the world, the Garden of Eden, in Central Asia, and to allow several thousands of years to have elapsed since Adam's creation beyond the term fixed by scripture.

According to their theory, Adam and Eve's descendants gradually peopled the world by successive immigrations from Central Asia. Thus the Chinese and other Mongolian tribes first went forth, with imperfect languages, and finally the Caucasian with his inflectional language. This makes the Caucasian and the Mongol descendants of the same parents, the Mongol being the elder. But, as a fact, never within the recollection of man have the same parents produced children both of the Mongolian and Caucasian races, and never has the one race been known to pass into the other. (It would be a striking phenomenon indeed if from the eggs of an eagle were to be hatched an eagle and a jackdaw. But this is not really at all more possible or impossible.)

There are very strong grounds for believing that the Caucasians once drove out wild Turanian races, whose territories they have since occupied, just as the Caucasians (Europeans) have possessed themselves of the lands of the Indians in America. But there is no sign that the Negro ever came where he now is from another part of the world, he seems on the contrary to have occupied his present position from the beginning. All nations of the Caucasian type, whether in Europe or India, claim, by the resemblance of their languages, a common origin, in Southern Asia. There are the clearest signs of the Caucasian having gradually spread from the place of the birth of the Caucasian race in early times, and he is still extending his power, as in America and Australia, another proof that the race of Adam was created after those of the Negro and the Mongol, for the origin of the Caucasian can be traced whereas that of the Negro and Mongol is lost in the mist of prehistorical ages.

The Scripture Record—Scientific men who, trying to adhere to the Divine record as they understand it, maintain that *all* mankind has sprung from Adam, assume the privilege of placing Adam's creation at about 20,000 years ago. This they are compelled to do, because this length of time would be necessary for the peopling of the whole world from one pair of human beings. Now the book of Genesis is so accurately true even in its details that the exact number of years can be calculated from Adam to the Deluge. For the age is given of each of Adam's descendants in a direct line. Thus,

Adam at the birth of	Seth	was	130	years old
Seth	Enos		105	,,
Enos	Cainan		90	,,
Cainan	Mahaleel		70	,,
Mahaleel	Jared		65	,,
Jared	Enoch		162	,,
Enoch	Methusaleh		65	,,
Methusaleh ...	Lamech		187	,,

Lamech at the birth of Noah was 182 years old
Noah at the time of the Flood 600 „

1656

The Scripture then continues the history of Adam's race down to historical times, and according to the Scripture Adam's family have been about 6000 years in existence. It appears, then, that such men as Bunsen and Prichard think right to neglect the account in Genesis in one point, while trying to adhere to it in another. But to disbelieve it in one particular is to declare it liable to error in all. Such a terrible consequence is avoided, if it be allowed that the book of Genesis is confined to the history of Adam and his offspring, and that it is not a history of the whole world. If this is kept in view, then the whole Scripture account is preserved in exact and beautiful truth. Science has shewn that human beings existed long before Adam, and it now remains to inquire whether Divine Revelation contradicts this conclusion. It will be found that it nowhere opposes it, but that, on the contrary, it strongly supports it.

In the Hebrew version of the book of Genesis two words occur, 'ish,' man, and 'Adam,' *a* man. The first includes all men, the second denotes an individual man. Again, the Hebrew "Adam" *a* man, is used, and also ha-Adam, *the* man. But the English translation does not preserve the difference of meaning in these words, and thus some ambiguity has arisen. In Gen. i, 26, 27, the word 'man' occurs twice: "Let us make *man* in our image and our likeness," and "God created *man* in his own image." This of course leads to the supposition that the genus man was now created, and that therefore it had had no previous existence. But according to the Hebrew it is, "Let us make Adam, or *a* man, &c," and "God created *the* man in his own image." Here the use of *a* man implies that he was not the only man, but that there were others before him; *the* man signifies the particular individual man whom God created in his own image, that is, Adam, or the Adamite. After the birth of Cain and Abel, Adam is no longer as before called *the* Adamite (ha-Adam,) for the obvious reason that he was then not the only man in God's image; but he is called 'Adam.' After Adam's death, his posterity are called "*the* Adam, or Adamite," to distinguish it from other races of human beings. The Scripture, then, says, that Adam was the first man created *in God's image and after his likeness*, but it seems to say that there were men before, but not in God's image. The advent into the world of the higher type of man has been recorded in the book of Genesis, and the history of his race is contained in that and the other books of the Bible. There are two accounts of Adam's origin in Genesis, one announcing his appearance as the crowning work of the creation; the other supplying the detail of the time, place, and circumstances

of his advent. The latter fixes the locality of the Garden of Eden. As the garden was watered by four rivers, the Pison, the Gihon, the Hiddekel (Tigris), and the Euphrates, it is evident that it was on the west of the Shat-el-Arab along its bank. The four rivers mentioned all run into the Shat-el-Arab, and thus form "a river that went out of Eden to water the garden, and from thence it was parted and came into four heads." In this Paradise originated the language of the Adamites, that is, the language of the Caucasians. For all the animals were brought to Adam, and he, by divine assistance, gave them names. This language was at once perfect, just as Adam was created in perfection. But language was useless without some one to converse with. Eve was therefore made and presented to Adam.

It has been suggested that Adam, though the first of a superior race, was the progeny of some pre-Adamite parents, and that he transmitted to his lineal descendants the characteristics distinguishing him from his progenitors. Never has a Caucasian been *known* to be born of Mongol parents. But, *supposing* that such a thing may once have occurred, how is that at the very same time a female with similar characteristics appeared, and that the two were brought together? It is as incomprehensible as two separate acts of creation, and directly contradicts the Scripture account. An undeniable proof of the existence of barbarous human beings previous to Adam's creation is furnished by the Scripture in the narrative of Cain's banishment from his family. In Gen. iv, 12-15, the Lord says to Cain: "A fugitive and a vagabond shalt thou be in the earth." And Cain said unto the Lord, "My punishment is greater than I can bear. Behold thou hast driven me out this day from the face of the earth, and from Thy face shall I be hid, and I shall be a fugitive and a vagabond in the earth; and it shall come to pass that every one that findeth me shall slay me." Therefore a mark was put on Cain, that no one might kill him, and he went and dwelt in the land of Nod, in the East of Eden. At this time Adam had only had two sons, Cain and Abel, and Abel was dead. If there were no human beings before Adam, whom had Cain to fear? Though he had sinned and been driven forth, still he was a son of Adam, and "whoever slew him, vengeance was to be taken sevenfold" on the slayer. Everything seems to point at the contemporaneous existence of other races, necessarily created before Adam. Cain had a son Enoch, and "he builded a city, and called the name of the city after the name of his son Enoch." It is scarcely probable that some six or seven persons, supposing that there were so many in Cain's family at the time, could build a city. It seems a natural and inevitable conclusion, that Cain by his superior nature gained an ascendancy over the wild savages among whom he found himself, and that they aided him in building a city. Probably in return for their assistance, and having no members of the Adamite family near, Cain allowed the savages to

settle with him in the new city and to inter-marry with his sons and daughters. The land of Nod was on the *east* of Eden, and it appears that Cain took with him the little amount of civilisation which is still to be seen in the east of Asia, among the Chinese and the High Asiatic nations. This will account for the presence of civilisation in a Mongolian people, and also for the stagnant state of that civilisation.

Lamech, a descendant of Cain, had three sons, Jabal, Jubal, and Tubal Cain. The first was the progenitor of "such as dwell in tents, and of such as have cattle." This clearly indicates the nomadic races which have from time immemorial wandered in vast hordes over the pasture lands of High Asia. The second son, Jubal, was "the father of all such as handle the harp and organ." The third, Tubal Cain, was the "instructor of every artificer in brass and iron," the discoverer of the art of metallurgy. With Tubal Cain, therefore, originated the use of metals in the place of stone. The discovery spread from Central to Southern Asia, and from thence to Europe and India.

The family of Seth, Adam's third son, remained in their own land, proclaimed the name of Jehovah, but built no city. Thus while Cain spread civilisation, but not the name of Jehovah, Seth proclaimed the name of Jehovah, but did nothing for civilisation.

Then came the Flood, by way of punishment for the sins of the Adamites. Cain's family had by this time (after about 1600 years) become thoroughly absorbed by the Mongolians with whom they had mixed. The other Adamites, with the exception of Noah's family, were destroyed by a deluge. It is unnecessary to detail at much length the grounds for believing that the deluge did not cover the *whole* earth. It was brought on to punish the descendants of Adam; they had not spread over the whole earth, nor over the greater part of it even; why, then, should the whole earth be subjected to the Flood? To turn to Science. It is simply an impossibility, that representatives of all the animals of the whole earth could have been contained in the ark; but there might have been room for two of every kind of animal found in that region. Again, it is an ascertained fact that animals are divided into different provinces, and that they have inhabited the same provinces for thousands and thousands of years, being found in a fossil state in the rocks in the same locality where the species are now living. If animals of every kind in the whole world flocked together, and entered the ark, many must have left the provinces where they lived before the Flood, as their fossil remains prove, must have remained in the ark, and then have returned to their former provinces. This, when the distance was thousands and thousands of miles, must have been no ordinary feat for the Apteryx, or wingless bird, of Australia, and creatures provided with no better locomotive powers and powers of navigation! But the Mosaic narrative does not require

a belief in a *universal* flood. If everything in the Scripture were only allowed to have *one* interpretation, how many passages would be stumblingblocks, which are not so in reality! The following is one of many such instances: On the day of Pentecost it is said that Jews "assembled out of *every nation under heaven.*" But in the following verses the nations from which they had come are enumerated, and they are only the nations from which Jews would be likely to come, *i.e.* the nations round Judæa, from Italy on the one hand to the Persian gulf on the other, including less than a fiftieth part of the earth's surface. Hugh Miller has even given a probable, but of course merely conjectural, cause of the Flood. He supposes that that portion of the globe where the rivers, as the Volga, the Oural, the Amour, &c., rise towards the coast and flow inwards into such seas as the Caspian and Aral, gradually sank down; that thus the Euxine and the Persian Gulf, in one direction, and the Gulf of Finland, in the other, were able to flow over the depressed surface, until even *all* the high hills that were under the *whole heavens* were covered (*i.e.* all the high hills in that part where the Flood prevailed). Gradually the depressed portion was again elevated, and the ark was grounded on Mount Ararat. A vast area of land in that region is still below the level of the sea.

Hitherto the children of Adam had not fulfilled their divine commission, "to replenish the earth and subdue it." After this judgment even, the children of Noah were not inclined to fulfil it, but they preferred to remain in one place. For this purpose they began to build the tower of Babel in the plains of Shinar. But the confusion of tongues compelled them to do that which they wished to avoid, and they scattered in different directions. The descendants of Japhet departed, one branch to the north and west, towards Europe, and another eastwards to Hindostan. The descendants of Shem remained nearer to their birth-place, spreading through Arabia, Egypt, and Palestine. The curse pronounced against Ham fell also upon his offspring, who did nothing for the cause of religion or civilisation. They are supposed to have invaded Egypt, which in the Bible is called "the land of Ham," there they resided 500 years, were driven out, invaded Syria, Greece, Carthage, were finally expelled thence also, and then settled in America. They have disappeared as a distinctive people, and have taken no place in history. Noah had predicted that they should be servants of servants to Shem and Japhet, and this was completely fulfilled. The Japhetites colonised Europe, Persia, and India, and from them sprang the Sanskrit, Persian, Greek, Latin, Slavonic, Teutonic, and Celtic languages. All these bear some resemblance to each other, as do also the Semitic languages, Aramaic, Hebrew, and Arabic. The two families together comprise the Caucasian languages.

The Adamite Dispersion.—It is by no means the least interesting part of the study of Adam's race, to trace his descendants to their present habitations. It has been mentioned that one branch of the Japhetites emigrated eastward. It seems undeniable that the present high-caste population of India have sprung from those ancient emigrants. It is needless to repeat all the arguments of physical resemblance, &c. The time-honoured and sacred Vedas of India contain allusions to the first Hindoos having come from a home in the west, having found in Hindostan aboriginal races little better than brutes, whom they conquered and whose lands they seized. Wonderful though it may seem, it is probable that the entry and passage of the Japhetites can be traced even now, from the mountains on the north of India, down the great rivers, to the south. For all along, ancient temples are left to bear witness to the immigration. From the very first the Indian Japhetites were divided into the three higher classes of the Brahmans or Priests, the Khashatriyas or Warriors, and the Vaisyas, the agricultural and commercial part. These three castes were called the Aryas, or "twice-born." There was also a fourth, the Sudra, inferior to the others. All this and much more is told by the Vedas, the Sanskrit records of the Hindoos. It is known that Sanskrit was a living language, and spoken as far south as the mouth of the Indus, in Solomon's time, 1000 B.C. For it is said that his ships brought "ivory, apes, and peacocks" from Ophir. The words used in the Hebrew version are not Hebrew words, but Sanskrit. Ophir therefore is India. Sir William Jones, calculating the time from the list of kings, has traced back the foundation of their rule to about the time of Abraham. Colonel Tod arrives at the conclusion that the Hindoos entered India proper about 2256 years B.C. This was near the time of the dispersion. Of course such calculations may not be exact, but there is every reason for believing that both Scripture and independent research fix the entry of the first Hindoos or Japhetites of India at the time of the dispersion. The aborigines of India have not been exterminated, but they have been driven from the central parts. They are still found in the north, where they are called Bhotiya, and in the south, the Tamulians. They are collectively known as the Nishadas of India, and are quite distinct from the superior Hindoos, being in fact Turanians, while their masters are Caucasians. The Tamulians also can be traced in the Deccan, which is almost entirely occupied by them, in the west along the Indus, and in the north-east along the Ganges. Thus it will be seen that they now occupy exactly the parts where an ejected race would be likely to take refuge, as far as possible, from the invaders. Though the Japhetites and the Aborigines have lived together for some thousands of years, they both still retain, the one the Caucasian characteristics, the other the Turanian

or Mongolian. The violent prejudices of caste in India become easily intelligible, if it is borne in mind that the Brahmins and the other Aryas are masters, and that they regard the Aborigines as servants. This prejudice, by preventing intermarriage between the two races, has preserved the distinctive peculiarities of each through all these centuries. There is, of course, a wide difference between Hindoos and Europeans in the *nature* of their civilization. This difference is due to the fact that in India the human mind has *bowed before* nature, whence it has become imaginative and superstitious, while in Europe the human mind has ever striven to *overcome* nature. The causes of this are to be found in nature itself, which in India is on a far grander scale, and therefore more likely to impress the mind with a sense of its own ignorance and of the awfulness of nature.

The semi-civilisation of the Chinese and their stagnant state have been already explained. Cain took civilization to them above 2000 years before the Japhetites emigrated to India, and that is the reason why they can claim such antiquity.

The second stream of Japhetite emigrants flowed westward into Europe. There are several proofs that this is true, and that the emigrants found an aboriginal race, which they completely destroyed. One proof is the presence of a Turanian language in the Basque provinces, showing that the aborigines were Turanians, *i.e.*, barbarians. They inhabited the lake-dwellings of Switzerland, and in fact all traces of man, as implements, fossil bones, &c., *previous to the bronze period*, belong to them. The Japhetities knew the use of metals, and first bronze, then iron implements were used. Bronze was known before the time of Homer, 900, B.C., perhaps long before that. The improvements in articles made of this metal appear to have been very slow, and if the bronze age was current in Europe 1000 years, B.C., it must have been originally introduced there far earlier, by the Adamites. There is every reason for believing that the current of civilisation set in from the east to the west. In the Danish kitchen-middens and peat bogs there are no traces of corn or domesticated animals, but in the bronze era there are both. Thus the nation which introduced the use of bronze, also had domesticated animals, as the pig, ox, sheep. Again, in the stone period, the dead were *buried*; but in the bronze they were burned and the ashes put in funeral urns. The latter custom is of eastern origin, and indicates that the invading and civilising race came from the east, at a time perfectly consistent with the Scriptural account of the Dispersion.

Abundant evidence, therefore, can be adduced from Ethnology, language, and other sources, in proof of the existence of human beings before Adam. It has been shown moreover that the book of Genesis does not contradict, if it

does not affirm this. There are, however, a few passages in the New Testament, which, if taken only in *one* sense, seem to contradict the existence of Pre-Adamites. For instance, St. Paul says that God "hath made of *one blood* all nations of men for to dwell on all the face of the earth." If St. Paul had been discussing the question as to whether all men had sprung from Adam or from other parents before him also, then this verse might be taken as affirming Adam to be the progenitor of all the nations of the world. But, as it is, the words had no such connexion, and it is therefore unreasonable to wrest them from their original meaning, in order to make them an argument against a theory which St. Paul probably had never heard of. (It may possibly be argued that, if St. Paul had never heard of it, it must be an idle and groundless theory. It is only necessary to remark that many questions of equal or nearly equal moment had never been discussed at that early period, but have since been firmly established). Another passage (1 Cor. xv. 39) may elucidate the meaning here. St. Paul says, "There is one "flesh" of men, another of beasts, &c." Probably "blood" is employed in the same sense as "flesh," merely implying that men are of a flesh, blood, or nature, differing from that of animals, fish, &c. Again, persons contending for a literal translation, and denying in a narrow manner that the words can contain any meaning but that which they regard as its real meaning, might maintain that St. Paul declares Adam to have been the first created man, when he calls him the "first man." They would, however, find a difficulty in retaining this literal interpretation consistently, for in the same chapter Christ is called the "second man." They would therefore either have to acknowledge that there may be more than one sense of a passage, or to confess their belief that no one was born after Adam until Christ. Other passages of the same nature might be mentioned, but they can be explained in the same way. If there is a double sense in all these, and if the literal means nothing in some, as in the last mentioned, it can not be wrong or in any way irreverent to take the second signification.

Thus, then, has the creation of Adam, after the existence of other human beings, been established by geology, by the spoken and dead languages of the earth, by ethnology, and above all (as it is quite allowable to assume in the absence of all evidence to the contrary) by Scripture. The history of Adam's family, of the Dispersion, and of the present differences of language and race on the earth, are all intelligible when it is borne in mind that Genesis is the history of one particular race, of the man "in God's own image," and that the present condition of the world shows the spreading civilisation of that race in contact with others.

The paper was too long to allow of any discussion that evening. There were 48 persons present: 3 Hon. Mem. 23 Members, 3 Associates and 19 Visitors.

MEETING HELD MARCH 24TH, 1871.

The minutes of the previous meeting were read and confirmed.

The President announced that a Microscope had been purchased by the Society, the use of which would be free to Members under certain restrictions.

Also, that Mr. Gregory, of Russell-street, had been re-arranging the geological collection. The extensive series of Middle Devonian Fish from Stromness, presented by J. B. Gilmore, Esq., proved of very great value, allowing not only of two good series for the Museum collection, but also of eight other sets, of various sizes, besides several single specimens, for presentation to other Societies. The collection of fossils presented by L. W. Hinxman had also proved of great value to the Society.

W. D. Fenning had resigned the Headship of the Archæological section, which had been accepted by A. C. Champneys.

W. H. Dobie, N. Loring, J. P. Kite, A P. Macgregor, A. S. Hopper, and F. W. Luby were elected Members, and W. Goodchild was elected an Associate.

Archæology.—W. D. Fenning exhibited a Queen Anne's farthing, presented by D. C. W. Lysons, and two sets of Japanese coins, consisting of an Itchi boss (value 1s. 4d.), a quarter Itchi boss and a Temple (value 1d.), presented by Rev. C. E. Thorpe; a Brazilian bank note, value 10d., presented by G. C. Swan; and some beads from an Egyptian mummy, lent by Mr. White. The Rev. J. W. Mills presented a piece of Roman pavement from Castor, near Peterborough.

Entomology.—J. B. Fuller exhibited a large case of Brazilian Insects, lent by Mr. White; Rev. J. W. Mills presented a box of British Insects, and E. L. Hesketh one of foreign beetles.

Ornithology.—E. L. Hesketh exhibited a specimen of the Greater Spotted Woodpecker (*Picus major*), shot in Savernake Forest, and a Stormy Petrel (*Thalassidroma pelagica*), picked up at Chippenham, both purchased by the Society.

Geology.—Rev. J. W. Mills presented a specimen of lead ore and lava from Vesuvius.

Botany.—The president exhibited a leaf of the Pitcher Plant, (*Nepenthes distillatoria*), presented by Rev. F. W. Farrar.

Library.—H. J. Verrall announced the donation of Griffin's, "Chemical Recreations," by R. W. Doyne.

F. E. Hulme, Esq., F.L.S., then read the following paper on

BOTANICAL NOMENCLATURE.

Many of my hearers will no doubt, when they first hear my title, have a strong feeling that the subject cannot but be dull and uninviting, a mere catalogue of names, more or less meaningless, more or less unpronounceable, and will further feel justified in their opinion, nay, confirmed in their belief, by the authority of our great poet, whose lines "What's in a name? that which we call a rose, by any other name would smell as sweet," supply them with an apt quotation. In spite however of this great authority I yet hope to prove that our subject is not altogether deficient either in interest or practical utility; for though some of the names of our English plants cannot now be satisfactorily analysed, there remain many which, when their significance is understood, may yield considerable information, some by their associations recalling the festive customs of the so-called "good old times," others the religious beliefs, the legends, or superstitious fears of our ancestors, while others again appeal either to the poetry of life, as the forget-me-not, or point out a practical domestic or medicinal service rendered. My attention was first more especially drawn to this subject from hearing a man of otherwise good education declare most unreservedly that these names were purely arbitrary; so far is this however from being the case that there is scarcely any botanical name, either scientific or colloquial, which may not with a very little amount of trouble be made to render up a very interesting fund of meaning.

For convenience of remembrance and reference we may divide our subject into several very distinct sections, such for example as names chosen arbitrarily or of which the meaning is now lost; names given either as defining some characteristic of a plant, or comparing it with some other plant; names given in honour of distinguished botanists, or those of the first introducers of a plant into England; then again a very large class deriving their force from a supposed resemblance of the plant to some other natural object; others from the domestic, dietetic, commercial, or medicinal use; others again given with reference to the area of distribution, together with several other broad and distinctive classes which we need not now mention, as they will be introduced in due course.

I would here desire before entering with greater detail upon our subject to express my own obligations to an excellent work by Prior on the "Popular names of British plants," which, together with "Hooker and Arnott's British Flora" and "Chambers Etymological dictionary," will render good service to those also who may care to pursue the subject at greater length than we are here able to do.

We commence then with our first section, names arbitrarily chosen, that is to say, not possessing any inherent fitness to justify their application to the special plants to which they are united and which do not

in themselves convey any increase of knowledge or suggestive associations, but are distinctive of any particular species by general usage and adoption only. Examples of this class are by no means numerous, and even when we encounter a word which after long investigation baffles all our efforts to arrive at a satisfactory conclusion, we must not hastily assign it a place in our present section, since though many of the scientific terms are Latin or Greek in their origin, others are Celtic, Scandinavian or Eastern, while amongst the more familiar English names some are obsolete, refer to customs long gone by, or have lost their original meaning through ignorant and careless repetition and modification. *Datura*, the generic name of the thorn-apple, tried by any classical standard will be pronounced meaningless, its derivation really being from its Arab name *Tatorah*, and in the same way *Nuphar*, the generic name of the yellow water-lily is derived from the Arabic *Nawfar*. Other examples are *betula*, derived from the Celtic word *betu*, the birch; *Alisma*, the water plantain from the Celtic word *alis*, water; and *salix*, the willow, from the Gaelic *seileach*. In the same way some of the words which we ordinarily use and accept as English, are, except by continued usage, not so at all; tobacco for example was adopted by the Spaniards from the word they found in use amongst the American Indians, so also was tomato, while lilac is the Persian name introduced together with the shrub thus called; in a similar manner our English word potato is corrupted from the Spanish *patata*, which they in turn corrupted from the Indian name for the plant, while the white or opium poppy derives its name from the Indian and Arabic name of the plant, *Affian*. As an example of the modification and perversion which names undergo as they are handed down from generation to generation, we may cite the familiar sweet William of our gardens, a plant originally so called from the French *oeillet*, a little eye, in allusion to its bright star-like flowers with their darker central spot of colour; the original meaning being lost and the pronunciation of the word slightly distorted soon led to its being termed Willy, and thence the transition to sweet William. In the same way the word asparagus, originally derived from a Greek word signifying to tear, many of the species being armed with sharp spines, being meaningless to the great majority of those who heard it, soon from the desire of the uneducated to modify an unknown word into one familiar to them, became the, in reality, much more meaningless word "sparrow-grass;" while in conclusion, not to needlessly multiply examples, the plant we term samphire was originally from its love of the sea-shore, dedicated to St. Peter, the fisherman of Galilee, and is still known amongst the French as *St. Pierre* and by the Italians as the *Herba di San Pietro*. As an example of the name of a plant becoming obscure from a custom connected with it becoming obsolete, I may just mention the ground ivy, which from its use at one time in brewing as a means of gilling or as we should now term it fermen-

ting, was known as Gill-run-by-ground, a name now meaningless. A few names arise from a certain sense of humour on the part of those who first started them, thus hemp from its use in providing the halter, is in some old books called gallows-grass, while others call it neck-weed, and this grim humour changes into contempt in the names dog's-violet, dog's-mercury and dog's-orach, the prefix as in the names hog-fennel, swine's-cress, and horse-mint, implying worthlessness; even the beautiful wild rose of our hedges shares this opprobrium, and that very widely, being not only dog-rose in English but the *rose de chien* of the French, and the *hundrose* in Germany. The fool's-parsley may also here be cited, as the plain inference is that none but those to whom this name fully applied would eat this poisonous herb in mistake for the garden herb which it slightly resembles.

We pass now to our next section, names either defining the nature of a plant or comparing it with some other plant. In this last division we may place the ivy-leaved speedwell, and the maritime plant which from its resemblance to the holly of the gardens is known as sea-holly, though botanically it has no affinity to it, in the same way that the *Alisma Plantago* or great water plantain bears an allusion both in its specific and vulgar names to a plant which it somewhat resembles, but which is no way connected with it. The names deriving their force from their allusion to the nature of the plant may refer to the method of growth, the locality where found, &c. The common bindweed is a very good illustration of this, binding and matting together as it does, the hedgerow plants to which it owes its support; its other and older English names are equally expressive, "with-winde" indicating the delicacy of the flowers as influenced by the passing breeze; "hedge-bell," alluding to the form of the flower and its habitat. In its botanical name *Calystegia sepium* we are again able to trace this undercurrent of meaning, *Calystegia* being from two Greek words signifying beautiful covering, in reference to the large heart-shaped bracteas, and the specific name *sepium* being the genitive plural of the Latin noun, *sepe*, a hedge. Cinquefoil, in allusion to the five leaflets which compose its leaf, (trefoil and milfoil being very similar examples,) ragged Robin from the torn look of its deeply cut petals, the *Ranunculus ficaria* from *ficus* a fig, in allusion to the peculiar shape of the root tubers, and albespyne (*alba* white, *spina* thorn) an old English name for the hawthorn or whitethorn, are other instances.

From the very numerous class of names which refers to the place where the plant may be found we need only select some one or two instances, as the Latin specific names *arvensis, aquatilis, sylvestris, pratensis, campestre, fluitans*, while the English names, water-buttercup, cliff-poppy, pond-weed, wall-flower, sea-heath, rock-rose, corn-marigold, marsh-mallow, bog pimpernel, house-leek, wood-sage, and many others carry their meaning so obviously to the

mind that any explanation of terms so palpable in their origin is altogether superfluous.

There are some few names which owe their origin to the locality in which the plant may be found, no less than those which we have just quoted, but which do not so clearly as those convey their meaning at first sight; bulrush is an example of this, as it was originally written pool-rush, the modern name being a corruption. The common brake also owes its name to the locality in which it flourishes, the derivation lying doubtfully between *brake*, the German word for underwood, and *brach*, uncultivated ground.

Many names owe their origin to a peculiarity in the growth of the plant itself, as the colour of the flower or fruit, texture of the leaf, and many other structural features; of these, the upright St. John's-wort, shrubby cinquefoil, red-berried bryony, alternate leaved saxifrage, tuberous carraway, perfoliate honeysuckle, rough-fruited bedstraw, pale-flowered persicaria, and curled dock (Fig. VI.) are a few examples out of many. The same influence has also largely affected the scientific names, thus we meet with *Asperula*, from *asper* rough, *pedunculata*, *acre*, *rosea*, *mollis*, *bicolor*, *rotundifolia*, *acutus*, *umbellatus*, *noctiflora* and a great variety of others.

The time of the year when a flower may be met with, or the duration of the life of a plant, are also indicated more or less clearly in the English names Christmas rose, pasque flower, (Paschal or Easter flower), cuckoo-pint, swallow-wort, Lent-lily, (an old name for the daffodil), and the May, a familiar name for the hawthorn; and again in the Latin specific names *verna*, *annua*, *perennis*, *autumnalis*, and *sempervirens*.

Another large section of names takes its origin from the custom of conferring the name of any one whom it is desired to honour upon some plant, and ordinarily one with which they are in some way connected, either as having introduced it to science or as having first successfully cultivated it in England; thus several of the new tropical plants introduced through the zeal of Messrs. Veitch very justly bear the specific name Veitchii. Linnæus himself selected a little Swedish plant under the title of *Linnæa borealis* to bear his name down to posterity, describing it as "a little northern plant, long overlooked, depressed, and flowering early" thus seeing in it an emblem of his own youthful career; this little plant thus rendered additionally interesting from this association, though a native of high latitudes (being most abundant in Lapland) is also to be met with in Scotland in the large fir-woods of the northern counties. The fuchsia and camellia are names given in honour of the introducers, the fuchsia, a native of Chili, being brought to Europe, in 1788, by Leonard Fuchs, a celebrated German botanist, whilst the camellia, a native of Japan and China, derives its name from Jacob Kamel, a Jesuit missionary, who brought it with him to Europe, in 1739. The genera

Sherardia, *Frankenia*, and *Knautia*, of our English flora are thus named in honour of James Sherard, an English botanist, of John Franken, a Swede, professor of medicine and botany in the University of Upsal, where he died in 1661, and of Christopher Knaut, a great Saxon botanist of the 17th century. *Bartsia*, *Hutchinsia*, *Mertensia*, *Sibthorpia*, and many others may also be met with in our lists. Another fruitful cause for this class of names arises from the researches of botanists in the study of any difficult natural group, hence many of the species take their name from the patient investigator who first identifies them; thus amongst the roses we get *Rosa Borreri*, *Dicksoni*, and *Wilsoni*, and amongst the brambles—*Rubus Salteri*, *Guntheri*, *Babingtonii*, and *Wahlbergii*. This may also be observed in various species of *salix*, *poa*, and many others.

In some few cases the name of a plant has been given to it from some more or less fanciful analogy, thus the *Bauhinia* (Fig XIII) was so called in honourable remembrance of Caspar and John Bauhin, the deeply two-lobed leaves of the genus no doubt suggesting these plants as being most appropriate to bear the fame of the two brothers to posterity. Though all the examples hitherto given have been of a pleasant nature, there are some examples, though these happily are few in number, where a little malice has been exercised in the choice of a name, but of these I need mention one only. The *Hernandia* was thus called from a man whose botanical pretensions at one time placed him in a position of considerable pecuniary responsibility, but whose discoveries were by no means an equivalent to the support afforded him, the point of the sarcasm being, that the plant selected to bear his name throws up a conspicuous mass of foliage, while the flower and fruit are, when produced, very small in proportion to what might be anticipated.

Where we find the English names thus composed it will generally be discovered that they refer to some legend or belief, as for example St. John's wort, or Herb Christopher, but this point we at present defer, as we shall go into the influence of legendary associations at greater length presently. The only two examples of familiar names derived from the names of persons upon which we shall at present dwell, are the cudbear and Ranstead's weed, cudbear being corrupted from the Christian name of Mr. Cuthbert Gordon, who first introduced the plant as a valuable dye to the attention of manufacturers, while the second example, though perhaps scarcely within our present scope, the name not being in use in England, is I think of sufficient interest to justify its introduction. A Mr. Ranstead, a Welshman, who afterwards emigrated to America, introduced many of the familiar British wild plants into his garden in Philadelphia, and amongst these the yellow toad-flax. This plant very speedily naturalized itself, and in a few years had spread over the whole of Pennsylvania and thence

to the neighbouring states. As a memorial of its introducer it is commonly known as Ranstead-weed.

Plants receive distinctive names both in their scientific and colloquial forms from the area of their distribution, thus we get the Nottingham catchfly, so called from one of the favourite localities of the plant; the Cheddar pink, an exceedingly rare plant, deriving its name from being chiefly found on limestone rocks at Cheddar, in Somersetshire; the Bristol rock-cress, another rare British species, St. Vincent's rocks near Bristol being the only place where it appears to grow at all freely; and the London rocket, so called from its occurring chiefly in waste places round London; a very familiar example also is the swede, a kind of turnip now largely grown for cattle food, but which was, as its name imports, originally derived from Sweden. In scientific nomenclature we meet with the specific terms *boreale, Anglica, Hibernica, Tunbridgense, Italica, Europæa, Norvegica, Pyrenaica,* all of them being words you will observe which have reference to locality.

We pass next to the consideration of two very large classes, names either derived from the economic, manufacturing, or domestic value of the plant, or pointing out its medicinal qualities real or imaginary. Though many of the names thus given, as for instance dyer's-weed, are so obvious in their derivation as to need no further comment, others from the necessity or custom which originated them having passed away, are by no means so clear, as for instance in the case of the old name of the ground ivy already referred to, thus too the bedstraw points to a time when instead of the modern substitutes, the beds of the poorer and middle classes were ordinarily stuffed with this plant when dried; in the same way the soapwort retains its name long after the use which originally gave it the name has ceased to exist. Bindwith, the name sometimes given by the old writers to the traveller's joy or wild clematis, indicates the use to which the long supple stems of that plant might well be put when chopping faggots by the road sides where it so freely grows. Fleabane as a means of ridding the dwelling of some of the inconveniences attendant upon want of cleanliness would be also by no means without value.

"While wormwood hath seed, get a handful or twaine,
To save against March to make flea to refraine:
When chamber is sweeped, and wormwood is strown,
No flea for his life dare abide to be knowne."

The teasel derives its name from the Anglo-Saxon verb *tæsan* to teaze, from the little hooks of the flower-head being employed in giving the nap to cloth, nothing else being found to do it so well, for though delicate machinery has been invented for the same purpose it is found to be too stiff and unyielding, hence teasels are still grown as a profitable crop for sale to the dresser of

cloth. When a plant has been at one time extensively used in any manufacture or other service, its name not only in England but frequently also throughout Europe will be found to testify to this—One or two examples of this will suffice. The soda-plant or glass-wort, so call from its ashes being formerly largely employed in the manufacture of glass was by the French called *la soude*, by the Germans *die sodapflanse*, by the Spainards *sosa* and by the Italians *soda*. The saffron-crocus, though discarded in modern practice as a remedial agent and only used to impart a rich colouring to other medicines, was at one time largely employed. From its beautiful colour and great repute the old chemists termed it the *aurum philosophorum* or *aurum vegetabile*. Its European names are derived from the arabic *sahafaran*, the French terming it *saffran*, the Italians *safferano*, the Spanish *asafran* and the Germans *safranplanse*. In like manner the rue, which from its healing virtues was also called by the mediæval herbalists the herb of grace is the *ruta* of the Italians, Swedes and Russians, *ruda* of the Spaniards, *raute* in Germany, and *ruite* in Holland, the French name being identical with the English. A curious instance is seen in the case of the woody nightshade, or as it is also called, the bittersweet, from the fact that the stalks when tasted have a slightly bitter flavour followed by a very considerable and peculiar sweetness: this peculiarity is not only pointed out botanically in the specific name of the plant and the English name bittersweet, but also in the word *amaradulcis* of the Spaniard, and in the familiar names for the plant amongst the French, Italians and Germans. Examples of Latin or Greek botanical names deriving their force from an allusion to the economic use of the plant may also be freely met with, but of these we need only instance three, as these will sufficiently indicate the nature of this class of terms. The word *Xanthium*, the generic title of the somewhat rare bur-weed, derives its significance from the Greek word for fair or yellow, in consequence of a belief that an infusion of this plant improved the colour of the hair. The *Sarothamnus scoparius* or broom plant derives its generic name from two Greek words signifying a shrub and to sweep, in allusion to its domestic use, a service which is also indicated in its familiar English name; while the deadly nightshade or dwale derives its specific name *belladonna* from the Italian language, the meaning being "beautiful woman." The name originated from a practice of using the fruit as a cosmetic, though we should have imagined that any added beauty thus derived would have been dearly bought. In Spain the plant is known as the *bella dama*.

A small class of names is founded upon games devised by children from the use of the plants in their sports; a familiar example of this is seen in the name blow-ball applied to the dandelion, in allusion to the compact mass of winged seeds which succeeds the flower and which children delight to scatter, seeing in how few expirations they can blow them all away. We see this

again in the name kemps, one of the old English names of the *Plantago media*. The Anglo-Saxon word *cempa* signifies a warrior, and the allusion here is to the child's game of fighting the stalks of that plant one against another, each child getting a certain number of the toughest stalks obtainable, and endeavouring to break as many as possible of those brought against them. In Sweden, where this game as in England is very popular with the children, the plant is termed *kämper*.

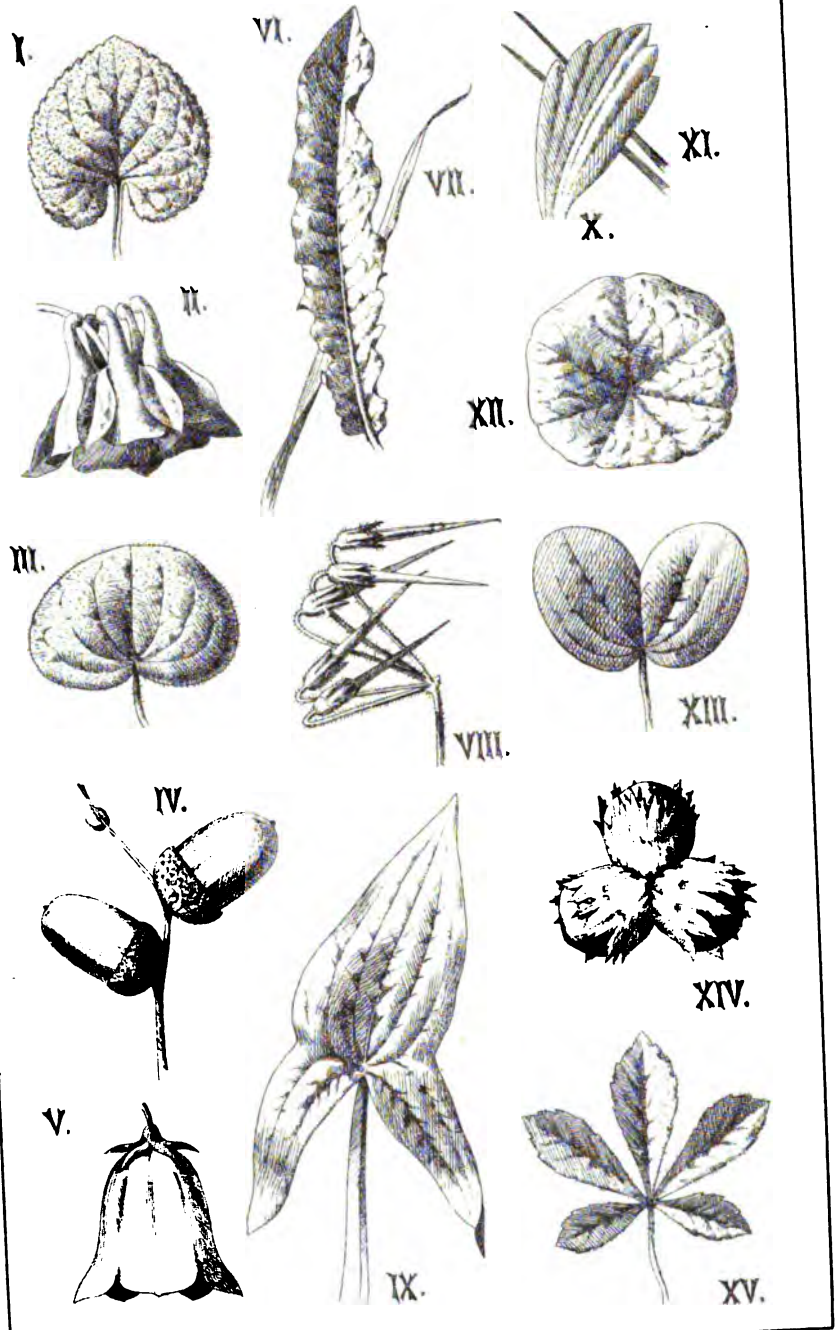
The names both scientific and English which derive their interest from an allusion to the medicinal value of the plants which bear them, form a very numerous section. Some of these names no doubt justly point out the remedial virtues of the plant, with which they are associated, others are based rather on astrological than true medical grounds, while a third large section is founded upon what, by medical writers, is called the doctrine of signatures. This doctrine of signatures, at one time so firmly relied on, was based on the faith that every plant possessed some healing virtue, and that every disease might thus be cured, for that for each an antidote had been provided by the goodness and wisdom of the Creator of all, and that He had in most cases stamped visibly upon the plants sufficient proof of their fitness for the alleviation of the varying ailments of mankind; or to quote the words of an old writer, "Though Sin and Sathan have plunged mankind into an Ocean of Infirmities, yet the mercy of God which is over all his workes maketh Grasse to grow upon the Mountains, and Herbes for the use of man, and hath not only stamped upon them a distinct forme, but also given them particular signatures, whereby a man may read even in legible characters the use of them." As examples of this we may mention the herb Robert and the foxglove; the first was held from the brilliant crimson of its leaves during the autumn to be in an especial degree serviceable as a vulnerary to arrest the flow of blood; the second from the form and colour of the interior of the flower was termed throatwort, and was held in great repute for its remedial efficacy in all relaxation or soreness of the throat. The following names so clearly indicate the medicinal effects which the plants were held to possess, that they need no further comment—all-good, gout-weed, livelong, nipplewort, toothwort, spleenwort, and wormwood. In other cases, though a name legitimately belongs to this category, the allusion may not be so immediately evident, thus the self-heal is also frequently called in old writings, carpenter's herb, hook-heal, and sickle-wort. Self-heal is sufficiently explanatory in itself, the other terms you will, on consideration, notice, testify to its services in curing the injuries which result from the edged tools of the carpenter, the pruning-hook of the woodman, or the sharp sickle of the reaper. The feverfew is so termed from its supposed virtues as a febrifuge. Many of the botanical terms, though less immediately obvious in

their meaning than the more familiar English names, also testify to the medicinal virtues of the plants with which they are associated; the *Salvia* (Lat *salvo*, to save or heal), the *Sanicula* (Lat *sano*, to cure), the *Sanguisorba* (Lat, *sanguis* blood, and *sorbeo* to staunch), the *Borago*, corrupted from *cor*, the heart, and *ago* to bring, in allusion to its exhilarating effects, the *Pulmonaria* (*Lat*, *pulmo* the lungs,) and the *Tussilago* derived from Lat, *tussis*, a cough, are a few examples out of many.

We now arrive at the largest class of all—names given to plants from a more or less real resemblance borne to some other object. This, appealing as it does both to the faculty of observation and the influence of the superstitious no less than to the love of the marvellous or strange, is in every country largely developed, and the same turn of mind which in the middle ages found so many objects in nature to justify the doctrine of signatures was no less alive to these accidental resemblances; many therefore are obvious enough to justify their names, while others do not so fully bear out the somewhat forced analogies which have been sought out. In this case, as in all the other examples derived from the various sources that we have indicated, many of the names yet preserve their meaning intact, and are as clearly to be understood now as at any past time, while others from change of dialect or custom do not so readily commend themselves to our understanding; in this latter subdivision we would merely instance the oak, hasel, columbine, and garlic, for though a list ten times as long might easily be added to these, our desire is rather to make the subject suggestive than exhaustive. The oak was by the Anglo-Saxons called *ac*, by the Swedes *ek*, and by the Danes *eg*, all these names are etymologically identical with egg, and refer to the egg-shaped acorns, (Fig IV), the oak like many other objects deriving its name from its product of greatest value, and though now we should certainly point to the timber as being the most commercially valuable, we must bear in mind that the oak, being a common indigenous tree, received a name when wealth lay rather in the possession of numerous herds of swine, and when the fruit of the oak rather than the wood rendered the greater service. The hasel-nut derives its name from the Anglo-Saxon word *hasel* a cap, and *knutu* a nut; the reference being to the large scales of the involucre, (Fig. XIV) the green and somewhat leaf-like cap within which we see the nut itself. Columbine is derived from the Latin word *columba*, a dove, another English word for the plant being culverwort, from the Anglo-Saxon *culfre*, a pigeon, and both these names indicating the strong resemblance of the ring of spurred petals to a group of little pigeons. This may be better seen on referring to our second illustration. Garlic, from the Anglo-Saxon words *gar* a spear, and *leac* a plant, is so called. from its acute and spear-like leaves; though it is only right to mention that another derivation which has been suggested is based on the Gaelic words, *garg*, pungent, and *luigh*, plant.

As examples of the more obvious names we may instance the arrow-head, the name being derived from the form of the leaf, (Fig. IX) and so marked is this resemblance that the generic and specific names also enforce it; the Latin word for an arrow being *sagitta*, and the botanical name of the plant *sagittaria sagittifolia*; the five-fingers, (Fig. XV) as the cinquefoil from its five spreading leaflets was at one time called; the adder's-tongue, ox-tongue, lamb's-tongue, pheasant's-eye, ox-eye, cat's-tail, horse-tail, colt's-foot, bird's-foot, goose-foot, lark's-spur, stork's-bill (Fig VIII), mouse-ear, hare's-ear, shepherd's purse, skull cap, Turk's cap, monk's hood, maiden-hair, rattle, snowflake, snapdragon, and many other examples might also be cited. Amongst the specific names of plants we meet with the following, all you will notice deriving their meaning from some suggested resemblance—*reniformis*, or kidney-shaped (Fig III); *serrata*, edged like a saw; *dentifera*, tooth-bearing; *filiformis*, thread-like; *lanceolatum*, like a lance-head; *cristata*, crested; *cordate*, heart-shaped, as in fig I, *peltate*, like a shield (Fig XII), *flabellifolia*, having leaves like a fan (Fig X), *acicular*, needle-shaped, as in the eleventh illustration; *apifera*, bearing flowers shaped like a bee; *pinnatifida*; like a feather; *ensifolia*, having sword-like leaves (Fig VII); *reticulata*, resembling network. In the same way we find amongst generic terms such words as the following—*campanula*, Ital. *campana*, a bell, and diminutive form of the word changed to *campanula*, a little bell (Fig V); *stellaria*, Lat. *stella*, a star; *Lycopsis*, from two Greek words signifying wolf-face; *delphinium*, Lat. *delphinus*, a dolphin on account of the shape of the upper petal; *lomaria*, from *loma*, a fringe.

Names based upon poetical associations.—This is a much smaller class than any we have yet mentioned; as it has, however, not been altogether without influence, we may mention some few examples. The first instance which occurs to our mind is the pretty little blue forget-me-not with its well-known legend. Some of my readers will, however, be surprised to learn that the present species (*Myosotis palustris*) has only borne that name for about fifty years. In two books published in the 16th century the germander speedwell (*Veronica Chamædrys*) is termed the forget-me-not, while most writers for a period of more than two hundred years apply the name to a very different plant and from a very different motive, the ground pine being the plant generally called by that name, and that too on account of the exceedingly nauseous taste which remains in the mouth if anyone is so imprudent as to taste the stem or leaves. The present species was first called forget-me-not in a work published in 1821. The speedwell, which has at times by the poets and other writers been called forget-me-not, receives both these names from the fragile nature of the plant,



F.E.W.

Photo Litho Whitmore & Bass.

the blossoms falling off directly they are touched; hence "speedwell," a common form of valediction in the middle ages and almost equivalent in meaning to our more modern "farewell" or "á Dieu" would seem especially appropriate to this tender little flower. The daisy with its bright little flowers springing up amidst the turf, means, according to Chaucer, the eye of the day, or day's eye.

"She that is of all floures the floure,
Fulfilled of all virtue and honoure,
And ever alike fair and fresh of hewe,
As well in winter as in summer newe.
As soon as ever the sunne ginneth west
To seen this floure, how it will go to rest,
For fear of night so hateth she darknesse.
Her chere is plainly spread in the brightnesse
Of the sunne.
Well by reason men it calle maie
The Daisie, or else the eye of the Daie."

The heart's-ease and traveller's joy are other examples; space, however, forbids any extended comment upon them.

Many names owe their interest to their connexion with mediæval legends or from the plants being dedicated, as was the custom, to certain saints, thus the yellow rocket dedicated to St. Barbara, is on that account also called herb Barbara; the cowslip is called herb-Peter from the pendent flowers faintly suggesting in form a bunch of keys, the badge of that apostle; the daisy is also called Marguerite from its being in flower as early as the 22nd of February, St. Margaret's day.

"The daisie, or flour white and rede
And in Frenche called la belle Marguerite,"

Chaucer.

The St. John's wort derives its name from the custom of gathering it with much ceremony upon St. John's day, the 24th of June, for the purpose of keeping it in the house as a "preservative from thunder and the wiles of evil spirits." The snowdrop was in the middle ages known as the "Fair maids of February," from its being in flower on the 2nd of February, when virgins dressed in white walked in procession at the Feast of the purification. The trefoil and the wood-sorrel from their leaves, each composed of three leaflets, and the *viola tricolor* from the three colours in each flower, have all at various times been known as herb-Trinity. The herb-bennet, an old name for the avens, is derived from the monkish name *herba benedicta*, the blessed herb, from a belief that when a root of it is preserved in the dwelling no evil has power to harm, "therefore" as an old

herbalist writes "it is blessed above all other herbes." Lady, as a prefix, generally alludes to the Virgin Mary, and is by no means uncommon, thus the parasitic dodder is also known as Lady's lace, the harebell as Lady's thimble, in obvious allusion to the form of the flower. Lady's finger, Lady's mantle, and Lady's slipper are other instances. The beautiful little ivy-leaved toad-flax is by the Italians also dedicated to the Virgin under the name of "Erba della Maddona." The name holly is evidently a corruption of holy and applied in consequence of its almost universal association, wherever met with, with the great festival of Christmas. *Christdorn*, the German name for it, together with the Danish, Swedish, and several other European names, still further bear out its ancient sacred character. Our concluding example, the amaranth, is a name chiefly given by the poets to express some unfading flower; there is, however, a genus of the same name in the English Flora. The term, amaranth, is derived from two Greek words signifying not withering, thus the passage in our New Testaments translated "a crown of glory that fadeth not away," is in the original Greek "the amarantine crown of glory," and the familiar name given to the English species is the everlasting flower, from its drying almost without change of form or colour if gathered and preserved. Milton is frequently found to use the word; it occurs several times in the "Paradise Lost."—The following fine passage from the third book will sufficiently well illustrate this application of it:—

"The multitude of angels, with a shout
Loud as from numbers without number, sweet
As from blest voices, uttering joy. Heaven rang
With jubilee, and loud hosannas filled
The eternal regions. Lowly reverent
Towards either throne they bow, and to the ground,
With solemn adoration, down they cast
Their crowns inwove with amaranth and gold.
Immortal amaranth, a flower which once
In Paradise, fast by the Tree of Life
Began to bloom; but soon for man's offence
To Heaven removed, where first it grew, there grows
And flowers aloft, shading the fount of life."

There were 51 persons present: 3 Honorary Members, 29 Members, 1 Associate, and 18 Visitors.

ILLUSTRATIONS TO PAPER.

I—Leaf of sweet violet. *Viola odorata.*
II—Flower of columbine. *Aquilegia vulgaris.*
III—Leaf of pareira. *Cissampelos pareira.*
IV—Acorns of common oak. *Quercus Robur.*
V—Flower of harebell. *Campanula rotundifolia.*
VI—Leaf of curled dock. *Rumex crispus.*
VII—Leaf of flowering-rush. *Butomus umbellatus.*
VIII—Fruit of stork's-bill. *Erodium cicutarium.*
IX—Leaf of arrow-head. *Sagittaria sagittifolia.*
X—Leaf of fan-leaved Myrothamnus. *Myrothamnus flabellifolia.*
XI—Leaf of Weymouth pine. *Pinus Strobus.*
XII—Leaf of nasturtium. *Tropæolum majus.*
XIII—Leaf of Bauhinia. *Bauhinia aculeata.*
XIV—Fruit of hasel-nut. *Corylus avellana.*
XV—Leaf of cinquefoil. *Potentilla reptans.*

MEETING HELD MARCH 31st, 1871.

The minutes of the preceding meeting were read and confirmed.

The heads of Sections gave their reports.

The Librarian announced the Donation of "Hogg on the Microscope" by F. Hulme, Esq. F.L.S., "Common objects of the Country" by R. W. Doyne, and the "Birds of Marlborough" by the Author. Also that the Society had purchased Oliver's "Lessons in Botany" and Bentley's "Handbook of Botany."

The President exhibited a case of Shells, minerals and Fossils, presented by the Rev. F. W. Farrar, F.R.S, among which were

Orange-lipped Spider Shell (*Pteroceras Aurantias*); Thorny wood cock *(Nurex Tenispinis)*; Peacock's-tail Madrepore (*Euphillia pavonia*); orthoceratite; Pentacrinite; Carbonate of Baryta; blue carbonate of copper; aloyonite; jasperated agate; Madrepore jasper, &c.

J. B. Fuller then read the following paper on—

DIATOMS AND DESMIDS,

illustrated by the aid of microscopes lent by the Master and other friends.

The term "Diatom" is applied to microscopically small vegetable cells (technically termed frustules), of the most varying shapes, which are found for the most part on the mud at the bottom of stagnant or slowly running water, giving it the brown appearance so frequently seen, or hanging to the leaves and stems of the different water plants. They may be regarded as consisting of two principal parts, the real vegetable substance, and the outer covering in which it is enclosed. The latter, though it probably has a basis of organic membrane, is hardened by silex or flint, the presence of which mineral is perhaps the best characteristic of the Diatomaceæ. It is therefore quite indestructible by the action of heat and most acids, and it is by the action of either of these agents that the inner vegetable matter may be removed, leaving the shells, which form such beautiful objects for the microscope, clear and entire. This vegetable matter, technically termed the "*endo-chrome*," is in the Diatomaceæ of a yellow, or yellowish brown colour, from the presence of iron, and although in immature specimens it is uniformly distributed over the inside of the shell, it afterwards is gathered into nodules or streaks, and only occupies part of the cavity of the shell. It is then that transparent vesicles and drops of oil become visible which in some species have been found to move about with a tolerably regular motion; also a central nucleus is often present. Diatoms must then be considered merely as the free cells of some larger plant. For just as all plants, are more or less, wholly formed of cells, so we often find thin filaments formed of a great quantity of Diatoms with their sides joined together, but which separate and break up into distinct cells on the slightest disturbance, from which peculiarity the name Diatom is derived. Filaments of all shapes and sizes may thus be formed; if the sides of each cell are parallel, a straight filament will be the result; if the sides incline towards one another at one end, a curved band, which need not continue entire, but may divide itself so as to form fan-shaped expansions or even spiral forms. Finally, Diatoms may be stalked, free, or enclosed in a gelatinous envelope, within which however they have free power of motion.

Diatoms were originally classed among animals from some of them, those spindle shaped especially, having when freed, a distinct power of motion from some cause as yet unknown, though it seems that some species are provided with vibratile filaments or cilia. But with the exception of this peculiarity all their habits, composition, and food show that they belong without doubt to the vegetable kingdom. This motion is probably due to the action of exosmose or endosmose, that is to the surrounding fluid passing in or out of the cell, so as

to force it along. That it is only involuntary is shown by the diatom trying to push away not avoiding anything that lies in its path, and if stopped remaining in that position for the time that it would take in its whole forward progression, if uninterrupted, and then going backwards for the same time. One species of Diatom, *Bacillaria paradoxa*, has movements of an extraordinary nature, the frustules or cells, which remain in connexion with one another, keep sliding one over the other, first in one direction, then in the reverse. This movement at any rate seems due to the presence of cilia, as currents have been detected in the water surrounding the plant.

I will now speak more particularly of the siliceous shell, by which the contents of each cell are protected. It is of the most varying forms, but always consists of two valves, usually symmetrical, either joined together at their edges, when a line is formed termed the line of suture, or both joined to an intermediate piece of flint, called the hoop, which then runs all round the shell and the breadth of which varies with the age of the specimen. It is by means of this hoop that one of the ways of reproduction takes place. The shells are of all shapes, lenticular, disc-shaped, spindle-shaped, navicular or boat-like, and one species is furnished with rays and spines of flint projecting beyond the disc-shaped shell. The valves are covered with the most beautiful and delicate markings and it is these markings, varying as they do in each species, that make the Diatomaceæ such an attractive study for the microscope. These markings, it must be remembered, are not spots or lines of a different colour to the surrounding shell, but are merely depressions or elevations and therefore they can as a rule only be seen under the microscope when a side light is thrown over them. They are not only on the outer flinty coating, but also on the inner membranous lining, as this retains them when all the flint has been removed by hydrofluoric acid.

Finally, as the shell is quite solid and impermeable, there are certain openings for a communication between the plant germ contained and the surrounding medium.

These openings, are generally found at intervals along the line of suture, but in Diatoms of an elongated form they are at the extremities of the shell. They do not appear to be absolute perforations in the shell, but merely points at which the siliceous covering is wanting, and are usually indicated by slight depressions. The endochrome of Diatoms differs from that of Desmids in being yellow or yellowish brown, while that of the latter is bright green.

New cells may be produced in two ways (1) by division of one cell into parts (2) by the conjugation of two cells.

They may be produced in the first way by the hoop, which joins the two valves of the shell, widening till the valves are separated some distance from

one another, when two new membranes are formed inside the enlarged shell, which ultimately form two new valves facing and immediately connected with the two outside and original ones; the hoop then falls off, leaving two distinct cells, each with one old valve and one new membraneous one, which soon becomes hardened and consolidated by silex. Of course the endochrome divides itself between the two new cells.

New cells are also originated by the process of conjugation. Two cells come together and after the excretion of a gelatinous mass, the interiors or endo-chromes of both are emitted through ruptures in the shells into it, where they meet and form a new cell with exactly the same form and markings as its parents, but of a much greater size. This is called a *Sporangial* cell. In some species two new cells are formed by the division of each of the endochromes into two equal portions, and half one endochrome uniting with half of the other. There is however a great difficulty here, as we should expect to meet with two kinds of cells belonging to each species, large and small, the large created by the conjugation of two small cells, and the small created by the division of a single cell into two of the same size as itself. But this does not seem to be the case, so it is most probable that each of the sporangial or large cells gives rise to a great number of little spores or *gonidia* which are freed and ultimately develope into the smaller cells. This theory appears to be most probable for then the process of conjugation actually results in the increase of the number of individuals in each species, as would naturally be expected, while if the sporangial cells suffered no farther change after their formation, a decrease not increase of individuals would necessarily be the result. It is too certainly supported by the fact that the contents of a Sporangial cell of the genus *Melosira* have been seen to display a motion analogous to "swarming."

If this is really the case the sporangial cells of the Diatomaceæ must be regarded as the vegetable representative of the Medusa or jelly fish among animals, which is thrown off by a zoophyte in order to reproduce new individuals of its species, the zoophyte being unable to reproduce them itself. These Medusæ sometimes attain a comparatively gigantic size, measuring often as much as four feet across, though the zoophyte they are sprung from is no higher than half an inch.

As regards the localities where Diatoms may be found, they abound in almost all water from the roadside ditch to the largest ocean. In fresh water they are most generally to be obtained by taking off the top of the mud with an iron spoon, or by picking waterweeds that have a slimy and yellowish looking appearance, and putting the same into the wide-mouthed bottle, which should be the constant companion of every Diatom hunter. To separate the Diatoms from the mud and bits of Confervæ, the best plan is, after pouring

them all together into a wine-glass, to let the mud settle first for a short time, and then pour off the water into another wine-glass, when the Diatoms and other light substances will be carried with it; allow the contents of this wine-glass a rather longer time for settling, then pour off the water into a third wine-glass, and so on till the water on being poured off seems quite clear. The advantage of this plan is that it separates the different species of Diatoms according to their weight, and so in the first glass will be found the biggest and heaviest species, those of next size in the second Glass, and the smallest in the last. The contents of each glass must be filtered and examined under the microscope. The next thing is to get rid of the vegetable matter inside the cells, which prevents their markings from being seen clearly, and also of small bits of Confervæ which have got mixed with the Diatoms. To do this empty the filtered contents of a glass into a test tube, containing a strong solution of nitric acid, and boil them in it slowly for about half-an-hour, when all vegetable matter will have been removed: the Diatoms must then be washed carefully in pure water. Great care must be taken in boiling the nitric acid, as the fumes are very poisonous, and will utterly spoil the lenses and brasswork of a microscope lying exposed in the room.

Another simpler but not so effectual a plan is to expose the Diatoms to a strong heat on a piece of mica, but to do this they must be transferred from the slide to the mica under a low power of the microscope. This may be easily done with a bristle from a shaving brush set in a short wooden handle, as soon as the water has evaporated from the slide leaving the Diatoms dry on it.

Marine Diatoms may be obtained from deep sea dredgings, by cutting open and examining under the microscope the gullets of shell-fish, (of whom they form the chief food) or from guano.

To obtain them from the latter the guano must be washed two or three times in pure water and allowed to settle, while the water with the Diatoms and lighter particles is poured off and finally allowed to settle; the deposit must be exposed to a gentle heat in a test tube, first in hydrochloric, next in nitric acid. The result will be found to consist almost entirely of Diatoms, and the flinty spicules from sponges. They are found fossil in large quantities all over the globe, as they are practically indestructible. Bermuda earth is almost entirely composed of beautifully marked disc-shaped Diatoms, and Scottish deposits from the Isle of Mull and Peterhead, are full of elongated Diatoms of the genus Pinnularia. These deposits are in the form of fine white sand. The Diatoms in them are shown much clearer when mounted in Canada Balsam, though perhaps for shewing the markings on them distinctly dry mounting is the best.

It must be remembered that whenever I speak of a Diatom or Desmid as being of large size, I mean only comparatively speaking, as the largest Diatoms

only appear to the naked eye as fine dust, while most of the smaller species are altogether invisible.

We next come to the "Desmids," another tribe of microscopic Algæ or water-weeds. These differ from Diatoms, roughly speaking, in consisting of cells destitute of a siliceous covering, but merely protected by a membraneous envelope. The forms of the different species are as varying as those of the Diatomaceæ, and the cell coverings are adorned with markings which are always elevations, differing in this from the Diatomaceæ whose markings may be either elevations or depressions. The cell coverings too are very frequently decorated with warty or spinous processes, while among Diatoms these only occur on a very few species. Finally the cell coverings show a tendency to split into two parts, not into two longitudinal valves, but transversely into two portions, each forming the end and part of the centre of the original cell. Accordingly while many species have a marked constriction or notch in the middle, in nearly all Desmids there appears to be a break in the endochrome about the centre of the cell. As a rule the cells are distinct, and isolated from one another, but sometimes filaments or stars are formed by the conjunction of a great many cells. The whole shell is surrounded by a gelatinous sheath, not always easily seen, but its presence is sometimes only indicated by the fact that the contact of different cells is prevented by it. The endochrome is always of a bright green, from the presence of Chlorophyll, the colouring matter in all plants, while as I have said before, that of Diatoms is yellow or yellowish brown from the presence of iron.

The most remarkable fact hitherto discovered with regard to Desmids is a circulation which is always going on, both between the outer cell covering and the inner lining membrane, and within the latter. This circulation has been asserted to be due to the action of cilia or vibrating hairs situated on both sides of the inner lining membrane. It is easily seen in a healthy specimen of "Closterium" when it seems to consist of two currents, which keep detaching from the endrochrome minute globules which are whirled with them both in the vacant space at the end of each cell where the inner lining retires from the outer covering, and also between the inner lining and the endochrome. There seems to be a communication between the two currents at either apex of the inner membrane where a jet from the inner fluid seems to be always disturbing and changing the course of the outer fluid as it passes the apices. There seems also to be communication with the surrounding water through the outer cell covering as, if pressure is applied to the Desmid, the water round both ends of the cell is disturbed as if by a jet of fluid.

New cells are produced in ways which are very similar to those of Diatoms. At present there is much uncertainty on the subject, but it is asserted that there are four ways in which they may be produced, two of which certainly

seems to be only modifications of one mode. They may be produced as among Diatoms by division of one cell into two parts but this takes place transversely not longitudinally and it is indicated in the first place by the cell becoming constricted in the middle and by the endochrome dividing into two parts. The cell then divides and the blunt ends of both halves, where they were divided from one another, lengthen out so as to make each half a perfectly symmetrical cell.

The next mode is by conjugation which so nearly resembles that of Diatoms that I shall not give it a long description. Two cells come together and emit their endochromes into a gelatinous mass which has been secreted and which ultimately becomes a larger cell. The further history of this cell is uncertain, but as a Desmid cell has been seen to give rise to a quantity of minute spores or gonidia, we may reasonably conclude that it was one of these sporangial cells, and that this is their ultimate work.

These spores ultimately develope into cells of the usual size.

In consequence of the cell covering being merely membranous, of course Desmids are much harder to preserve then Diatoms. Glycerine will preserve the external form, but when in place of the native water it soaks into the endochrome it injures its form by its greater density; however a fluid compounded of distilled water, alcohol, and glycerine has been lately made known which combines with the density of common water the preservative powers of glycerine, so Desmids placed in it hardly suffer the slightest change in form or colour for an exceedingly long time.

Desmids are found in nearly the same localities as Diatoms, though perhaps preferring rather clearer water. I have not found them as common as the latter, but I have heard that in some places the water weeds are absolutely covered with them.

Before concluding I ought to state that both these classes of Algæ have been called animals by Professor Ehrenberg. This mistake must rather be attributed to the imperfect microscopes and badly defining lenses of his time than to any carelessness in his observation. That they are vegetable may be proved by their food and habits. In their food they can derive nourishment from inorganic or mineral matter, while animals can only with a very few exceptions exist on organic food, and when they take in carbonic acid gas they reject the oxygen and assimilate the carbon, as all other plants do, while animals take the oxygen into their tissues and reject the carbon.

Because they have the power of locomotion they must not on that account be placed among animals, for their motion seems to be perfectly involuntary; they can only move for a limited time in one direction and then have to go back for the same time; if they meet any obstacle instead of avoiding it they run into it, and if stopped remain still for the time remaining for their forward

motion and then retire. The possession of cilia or vibrating hairs was formerly considered as peculiar to animals, but it is now prove that undoubted plants possess them as the zoospores and seeds of confervæ. For these and many other reasons they have been placed in the vegetable kingdon, though it must be confessed so near an approach do they, and many other microscopic Algæ, make to the lower orders of the animal kingdom, that it seems probable that there is great foundation for the plan of Prof. Haekel, who suggested that an intermediate kingdom should be formed consisting of all these doubtful organisms.

T. C. Owen was deprived of Membership for non-attendance and A. H. G. Skrine was elected a member.

There were 39 persons present, 1 Hon. Mem., 27 Mem., and 11 Visitors.

MEETING HELD APRIL 6TH, 1871.

The minutes of the previous meeting were read and confirmed.

There was no business transacted, in order to give more time for a paper by the Rev. J. F. Bright on "Ocean Currents," illustrated by experiments.

A. E. W. Colville and R. Armitage were elected Members, and R. St. J. Boddington, and H. B. Jeffreys, Associates.

There were 93 persons present, including the Revs. the Master and Dr. Butler of Harrow, 10 Honorary Members, 34 Members, 3 Associates, and 46 Visitors.

MEETING HELD APRIL 21ST, 1871.

The minutes of the previous meeting were read and confirmed.

No further business was transacted, to allow more time for a lecture by the Rev. T. A. Preston, on "Air," illustrated by experiments.

The President announced the election of J. E. Pierson and J. W. Dudding as Members.

The Rev. the Master proposed a vote of thanks to the President for his interesting lecture, and introduced Mr. Hayward, President of the Harrow Scientific Society.

Mr. Hayward then thanked the Society, and the President especially, for the assistance they had rendered the Harrow Society, and particularly for the fossil fish lately sent there.

There were 80 persons present: 5 Honorary Members, 35 Members, 4 Associates, and 36 Visitors.

MEETING HELD MAY 5TH, 1871.

The minutes of the previous meeting were read and confirmed.

W. D. Fenning exhibited some electrotype copies of gold and silver coins, chiefly Greek and Roman, lent for the occasion by the Rev. C. Soames.

There were no further exhibitions, to allow more time for the following paper by A. Babington, Esq., on

SLEEP, DREAMS, AND SOMNAMBULISM.

WHEN I promised this half to read a paper to the Society, I intended to continue the subject which I began last half. For reasons which I need not specify I have been unable to do so now, though I hope to be able to do so at some future time. As to the subject which I have chosen for this evening's paper, I wish to make three remarks about it:

(1). It is a subject which is of immediate interest to us all, inasmuch as there is no one here probably who does not enjoy his eight hours' sleep in the twenty-four: some of us, it may be, are possessed with an even more insatiable appetite for this boon of human life.

(2). It is a subject eminently worthy of the dignity of this society. It has engaged the attention of some of the greatest philosophers of antiquity: and Plato, who would have scorned to stoop to an enquiry into the nature and properties of beetles and butterflies, did not think it unworthy of his vast genius to examine the origin and significance of dreams.

(3). Should this paper prove to you as unentertaining as I fear it may, I shall at least enjoy the supreme satisfaction of feeling that I may, if I fail in aught else, nevertheless succeed from the somnolent nature of my theme in lulling some of you into that state of blissful repose which knows no waking. And should this be the case, I can assure you that so far from being offended

I shall esteem it as the highest favour, because I shall thereby be enabled to provide the rest of my audience with an admirable series of spontaneous experiments.

There is little difficulty in discovering the physiological phenomena of sleep. It may be described as the periodical repose of the organs of the senses and the greater number of the intellectual faculties and voluntary movements. The approach of sleep is announced by diminished activity of mind and loss of the power of attention. The senses become blunted to external objects, our ideas grow more confused, our sensations more obscure, and if our ears still perceive sounds, they are indistinct and seem as though distant. At last our eyes close, our joints relax, and we sleep.

During sleep the organs of the vegetative life, such as growth, development, digestion, continue to discharge their functions with almost as much activity as in the waking state. Our respiration is regular, our heart continues to beat. When we get up we are nearly an inch taller than when we went to bed, owing to the expansion of the cartilages of the back. Hence the popular theory that sleep is favourable to growth. I remember my nurse saying to me: "Mind you always stretch your legs well, my dear, before you go to sleep or you'll never grow up to be a man."

But even the functions of animal life, such as sensation and voluntary motion, are not in a state of complete repose, as may be seen from somnabulism.§ [So, too, horses sleep standing; birds roost on one leg; and postilions have been known to nap on horseback.

In man the want of sleep varies: the infant sleeps almost continually; persons in middle life can do with less sleep than very old men; and women require less sleep than men. Habit will do much towards engendering habits of wakefulness. Frederick the Great managed to do with four hours' sleep only; Thomas Parr, who lived till 140, slept almost continually towards the end of his life.

There is one important feature to be noticed about sleep, viz., its periodical return. This is not due simply to the fact that light comes with the day and darkness returns with the night; for if our occupations require it we can transpose night and day, sleep during the former and wake during the latter. Nor can sleep be ascribed to weariness only, it would rather seem as if excessive fatigue tended to keep off sleep: we have all heard the expression "I am too tired to sleep," and perhaps there are some here who, like myself, have had practical experience of it on the evening of football House Match. Hence sleep would seem to be analogous to various other facts which we may notice in the natural world,-to the succession of the seasons, to the ebb and flow of the sea, to the regular declination of the magnetic needle eastward and westward at different hours of the day. It is perhaps to this principle of alternation and reciprocity that the change from sleeping to waking is due.

The physical phenomena of sleep are, however, less worthy of attention than the mental; and these mental phenomena may be comprehended under two heads—Dreams and Somnambulism. And Dreams may be described as trains of ideas presenting themselves to the mind during sleep.

The first question by which we are met in our examination of these mental phenomena is as old as Aristotle, viz., do we always dream during sleep? Many eminent names can be quoted who have from psychological or philosophical reasons taken different sides in this controversy. There is a curious case quoted by Dr. Perquin, a French physician, of a female, 26 years of age, who had lost by disease a large portion of the skull-bone and dura-mater, so that a corresponding portion of the brain was bare and open to inspection. He says: "When she was in a dreamless sleep her brain was motionless, and lay within the cranium. When her sleep was imperfect and she was agitated by dreams her brain moved and protruded without the cranium, forming cerebral hernia. In vivid dreams, reported as such by herself, the protrusion was considerable; and when she was awake, especially if engaged in lively conversation, it was still greater." If we may rest an argument on this account, it would certainly seem that dreamless sleep is possible.

It may be further observed in reference to this subject that where sleepers have turned their attention to their sleeping thoughts, and have desired to penetrate into them, not only fragments of their dreams but connected series have been recovered; and that as a general rule, the greater the mental excitement has been the more perfect is the memory of dreams. May we not, then, believe that our sleeping thoughts are regulated in this respect by the same laws as our waking thoughts? No one can remember the vast majority of the thoughts and impressions of a past day; even the greatest exertion of the memory will fail to recall scenes and impressions which at the time affected us strongly. If any of you on going away this evening will attempt to put down on paper all that he has done and seen and heard and said since he got up this morning, he will find that he can scarcely recall a tenth part. It is the law of our mental being that we should forget; and therefore of all the numberless visions which have peopled our sleeping hours the greater number have vanished with the morning light.

Even this, however, will not altogether explain the evanescence of our dreams. We must recollect that most of what we remember so vividly in daily life has in some way or another affected our senses of hearing, or sight, or feeling: but in sleep these senses are dormant. Again, we remember events in great measure because they are connected with the flight of time: each hour serves as an index to the memory: one event took place after breakfast, another before dinner, and so forth. But in sleep all the laws of time disappear: a few seconds may seem an hour in duration, or the dreams

of a whole night may appear to be crowded into a couple of minutes. It would seem that no argument in favour of dreamless sleep can be based upon the fact that we have no memory of our dreams when we wake.

There is one argument in favour of the fact that we always dream which I met with the other day. "If," said this author, "we do not dream always, how is the beginning of our dreams accounted for? The mind on this supposition at a particular period is void of ideas; an idea suddenly enters it and dreaming begins. Now the idea was not called up by an idea antecedent to it, for antecedently there was no idea in the mind?"

This argument is ingenious, but I fear that it is not more than ingenious, for a sensation is quite as capable of exciting an idea as an antecedent idea would be; a slight feeling of cold in our toes because we have kicked off the bed-clothes, a little draught from a half-closed window, or a somewhat airy ventilator, an attack of indigestion following a too substantial tea, would be quite sufficient to originate a dream, even supposing the mind had been void of ideas previously.

The ordinary fabric of dreams is familiar to most of us. In general the materials out of which they are constructed are recent and ordinary impressions fantastically arranged. In accordance with this rule it is commonly said that a man's character and pursuits determine his dreams, in other words the thoughts and actions which are most familiar to him when awake most constantly invade his sleeping hours. This idea has been charmingly worked out by Shakespeare in his description of Queen Mab:

> She gallops night by night
> Through lover's brains and then they dream of love;
> O'er courtiers' knees that dream on court'sies straight,
> O'er lawyers' fingers, who straight dream on fees,
> O'er ladies' lips, who straight on kisses dream;
> Sometimes she gallops o'er a courtier's nose,
> And then dreams he of smelling out a suit;
> And sometimes comes she with a lithe pig's tail,
> Tickling a parson's nose as 'a lies asleep,
> Then dreams he of another benefice.

But it is very often the case that dreams are suggested by external impressions upon one or another of the senses. A distinguished sculptor once related how he dreamt that he had to see a Mr. Jones, and that in order to do so he walked up a large flight of steps leading to a very large house intending to enquire for him; but as soon as he asked the servant if his friend resided there, a little, pert, dwarf-like figure, suddenly started up on one side of him and asked in a shrill, squeaking voice, "What Jones? What Jones?" Vexed at this impertinent intrusion, the dreamer determined to be more cautious

and going up to the next house repeated his question in a lower tone, when the same dwarf asked "What Jones? What Jones?" He turned away in anger and woke, to hear some one passing under his window and calling out, "Hot rolls! hot rolls!" In a like manner a gentleman who lodged with a grocer dreamt one night that he had committed some heinous sin, and had been condemned to be incarcerated in a huge cheese, a thousand starving rats were then let loose upon this cheese, and gnawed through it on all sides till they came to him. He made a frantic effort to escape, and awoke to find himself almost stifled by an oppressive smell of new cheeses which his landlord had got in on the previous evening.

A more curious story still is told of an officer in the expedition to Louisburg, in 1758, in whom all the faculties continued so alive to the slightest impressions that his companions were in the constant habit of amusing themselves at his expense. They could produce in him any kind of dream by whispering in his ear. One time they conducted him through the whole progress of a quarrel which ended in a duel; and when the parties were supposed to have met, a pistol was put into his hand which he fired, and was awakened by the report. On another occasion they found him asleep on the top of the locker in the cabin, when they made him believe that he had fallen overboard, and exhorted him to save himself by swimming. They then told him that a shark was pursuing him, and entreated him to dive for his life, he instantly did so, and with so much force as to throw himself from the locker to the floor by which he was much bruised.

Accordingly when age or disease has destroyed a sense our dreams are impoverished in proportion. Those who have grown blind no longer recall landscapes in their dreams, those who have grown deaf no longer fancy that they are listening to strains of music. It is curious, however, to notice that Dr. Blacklock, the poet, who became blind when an infant, believed that he was endowed with a sense when asleep of which he had no cognizance at other times, which brought him into contact with external bodies by means of threads passing from them to his body.

It is in reference to the connection of the senses with dreams that Abercrombie remarks: "Our most vivid conceptions are certainly of objects of sight; and they appear to be much less distinct in regard to tastes, smells, and even sounds. Accordingly, I think, dreams are chiefly occupied with objects of sight; and I am not sure that we dream of tastes or smells, or even of sounds, unless when a sound actually takes place." He mentions the case of a friend of his who was an extremely keen sportsman, and who frequently dreamt that he was out shooting: but often as the dream recurred he never once dreamt that he fired his gun; whenever he pulled the trigger it missed fire. I should be glad if any one of my friends present here to-night who

belong to the shooting division of the Rifle Corps, would furnish me with statistics on this point: do they ever dream that they are competing for the Monthly Cup? and if so, does their rifle go off? or does it prove as incapable of a discharge as their unexplosive carbine.

It is natural that our wonder should often be excited by the confusion in our dreams, in this they resemble the visions of the insane. The incoherence of a madman is probably little more than the outpouring of thoughts as they occur without the explanation of the association by which they are linked together. Dreams often appear confused and chaotic from a similar cause. But it is a mistake to suppose that this confusion is peculiar to dreaming and insanity. It does not indeed occur in spoken or written thoughts, because these are for the most part carefully thought out and elaborated, pulled to pieces and rearranged: but we have only to read a soliloquy of Hamlet or Macbeth, or that fine passage in "Old Mortality" after Morton has been condemned to death by the Covenanters, to see that such a confusion is possible at any time under the influence of strong excitement.

One of the most striking peculiarities of dreams is the strength of the memory. Persons and things are often recalled in our waking hours by a sight or a sound; but whereas during the day impressions thus recalled are usually most faint and indistinct, during the night they recur with a vividness which seems almost supernatural.

In the notes to the "Antiquary" Sir Walter Scott relates an interesting story illustrative of this point, which, as it may not be familiar to all of you, I shall take the liberty of reading. Mr. Rutherford, a gentleman of landed property, was prosecuted for a very considerable sum, the accumulated arrears of tithe for which he was said to be indebted to a noble family. Mr. Rutherford was strongly impressed with the belief that his father had, by a process peculiar to the law of Scotland, purchased these lands from the person to whom the tithe was due, and therefore the present claim was groundless. But after an industrious search among his father's papers, an investigation of the public records, and a careful enquiry among all persons who had transacted law-business for his father, no evidence could be recovered to support his defence. The period was now near at hand when he conceived the loss of his law-suit to be inevitable, and he had formed his determination to ride to Edinburgh next day and make the best bargains he could in the way of compromise. He went to bed with this resolution, and, with all the circumstances of the case floating upon his mind, had a dream to the following purpose. His father (who had been many years dead) appeared to him (he thought), and asked why he was disturbed in his mind. In dreams men are not surprised at such apparitions. Mr. Rutherford thought that he informed his father of his distress, adding that the payment of a considerable sum was the more

unpleasant to him because he had a strong consciousness that it was not due, though he was unable to recover any evidence in support of his belief. "You are right, my son, replied his father's shade, I did acquire the right to those tithes for payment of which you are now prosecuted. The papers relating to the transactions are in the hands of Mr. Jones, an attorney, who is now retired from professional business and resides at Inveresk, near Edinburgh. He was a person whom I employed on that occasion for a particular reason, but who never on any other occasion transacted business on my account. It is very possible, pursued the apparition, that Mr. Jones may have forgotten a matter which is now of a very old date; but you may call it to his recollection by this token, that, when I came to pay his account, there was difficulty in getting change for a Portuguese piece of gold, and that we were forced to drink out the balance at the tavern. Mr. Rutherford awoke in the morning with all the words of the vision imprinted on his mind, and thought it worth while to ride across the country to Inveresk instead of going straight to Edinburgh. When he came there, he waited on the gentleman mentioned in the dream, a very old man. Without saying anything of the vision, he inquired whether he remembered having conducted such a matter for his deceased father. The old gentleman could not at first bring the circumstance to his recollection, but on mention of the Portuguese piece of gold the whole returned upon his memory; he made an immediate search for the papers and recovered them, so that Mr. Rutherford carried to Edinburgh the documents necessary to gain the cause which he was on the point of losing. Sir Walter Scott adds his explanation, viz.,—that the dream was only the recapitulation of information which Mr. Rutherford had really received from his father while in life, but which at first he merely recalled as a general impression that the the claim had been settled.

What is even more singular is that events may be brought up by association in dreams which had been so communicated to the mind as never to become objects of memory at all. During an investigation in the north of Scotland respecting an atrocious murder committed on a pedlar, a man came forward voluntarily and declared that he had had a dream in which there was represented to him a house, and a voice directed him to a spot near the house in which there was buried the pack of the murdered person. On search being made the pack was found, not precisely at the spot which he had mentioned, but very near it. The first impression on the minds of the public authorities was that he was either the murderer or an accomplice in the crime. But the individual accused was soon after clearly convicted; before his execution he fully confessed his crime, and in the strongest manner exculpated the dreamer from any participation in, or knowledge of, the murder. The only fact that could be discovered calculated to throw any light on the occurrence was, that

immediately after the murder, the dreamer and the murderer had been together in a state of almost constant intoxication for several days; and it is supposed that the latter might have allowed statements to escape from him which had been recalled to the other in his dream, though he had no recollection of it in his waking hours.

What is quite as remarkable as this is the extent to which extraordinary mental efforts are made in sleep, and which seem to surpass anything of a like kind in our waking hours. M. Maury says: "I have sustained discussions and combined answers to ward off formidable objections: I have conformed in my conduct to the character of those whom I have brought up in my dreams. More than this I have become conscious of ideas and inspirations which I never knew when awake." Monboddo gives the case of the Comtesse de Laval a woman of perfect veracity and good sense, who when ill spoke during sleep in a language which none of her attendants understood, and which even she was disposed to regard as gibberish. A nurse, however, detected the dialect of Brittany. Her mistress had spent her childhood in that province, but had lost all recollection of the Breton tongue, and could not understand a word of what she said in her dreams.

The most wonderful story of this kind is that recorded by the great poet Coleridge in his "Biographia Literaria." "A young woman," he says, "of four or five and twenty, who could neither read nor write, was seized with a nervous fever; during which, according to the asseverations of all the priests and monks in the neighbourhood, she became possessed, and as it appeared by a very learned devil. She continued incessantly talking Latin, Greek, and Hebrew, in very pompous tones and most distinct pronunciation. This possession was rendered more probable by the known fact that she was or had been a heretic. Voltaire humourously advises the devil to decline all acquaintance with medical men; and it would have been more to his reputation if he had taken this in the present instance. The case had attracted the particular attention of a young physician, and by his statement many eminent physiologists and psychologists visited the town, and cross-examined the case on the spot. Sheets full of her ravings during sleep were taken down from her own mouth, and were found to consist of sentences, coherent and intelligible each for itself, but with little or no connection with each other. Of the Hebrew, a small portion only could be traced to the Bible, the remainder seemed to be in the Rabbinical dialect. All trick or conspiracy was out of the question. Not only had the young woman ever been a simple, harmless creature; but she was evidently labouring under a nervous fever. In the town in which she had been resident for many years, as a servant to different families, no solution presented itself. The young physician, however, determined to trace her past life step by step; for the patient herself was incapable of returning a rational

answer. He at length succeeded in discovering the place where her parents had lived: travelled thither, found them dead, but an uncle surviving, and from him learnt that the patient had been charitably taken by an old protestant pastor at nine years old, and had lived with him for some years. The solution of the phenomenon was then obtained, for it appeared that it had been the old man's custom, for years, to walk up and down a passage of his house into which the kitchen door opened and to read to himself with a loud voice out of his favourite books; the physician obtained these books and succeeded in identifying so many passages with those taken down at the young woman's bedside, that no doubt could exist in any rational mind concerning the origin of her nocturnal ravings."

We read further that Cabanis in dreams often saw clearly the bearing of political events which had baffled him when awake; and that Condorcet when engaged in some deep and complicated calculations, was frequently obliged to leave them in an unfinished state and retire to rest, when the results to which they led were unfolded to him in dreams. Brodie mentions the case of a friend of his, a distinguished chemist and natural philosopher, who assured him that he had more than once contrived in a dream an apparatus for an experiment he proposed to make; and that of another friend, a mathematician and a man of extensive general information, who has solved problems when asleep which had baffled him in his waking state. The same author mentions the case of an acquaintance of his, a solicitor, who being perplexed as to the legal management of a case, imagined in a dream a mode of proceeding which had not occurred to him when awake, and which he adopted with success. Dr. Gregory tells us that he had thoughts occurring to him in dreams and even the very expressions in which they were conveyed, which appeared to him afterwards when awake so just in point of reasoning and illustration, and so happily worded, that he used them in his lectures. While on this part of my subject, I cannot pass over the remarkable case of the poet Coleridge. He had taken a sleeping draught which had been prescribed to him in consequence of a slight indisposition, and fell asleep in his chair while he was reading in Purchas' "Pilgrimage," of a palace built by Khan Kubla. He remained asleep for about three hours during which he himself tells us: "I could not have composed less than from two to three hundred lines, if that could be called composition in which the images rise up before us as things, the corresponding expression being produced without any conscious effort. On awaking I felt convinced that I could remember the lines, and jumping out of bed I wrote them down as fast as I could." The poem begins:

In Xanadu did Kubla Khan
A stately pleasure-dome decree,
Where Alph the sacred river ran

Through caverns measureless to man
Down to a sunless sea.
So twice five miles of fertile ground
With walls and towers were girdled round:
And there were gardens bright with sinuous rills
Where blossomed many an incense-bearing tree
And here were forests, ancient as the hills,
Enfolding sunny spots of greenery.

Probably not a few of us would be glad to have the power of writing such verses in our waking hours.

There is one doctrine which I must notice respecting sleep, viz., that the will loses all its power, is absolutely dethroned. Hence it is commonly said that we have no power of controlling our dreams. And this is no doubt partially true, but it is scarcely the whole truth. For instance, there are some amongst us who possess the rare power of awaking at Voss' bell, though few, I fear, possess the still rarer power of getting up at the same. This power of awaking at a particular hour is surely the result of the active will asserting its sway over the sleeping body. In like manner there have been cases where even in dreams the sleeper has consciously exerted his will: thus Dr. Reid is stated by Dugald Stuart to have succeeded in dispelling the frightful dreams by which he was annoyed. Whenever he dreamed that he was in danger on a bridge or on the brink of a precipice, he cast himself down by a strong effort of the will, and succeeded in getting rid at once of the scene and the terror, apparently without recovering consciousness. And Scott has worked out the same idea at the close of the first canto in the Lady of the Lake, where Fits-James after waking from his night-mare exclaims:

Can I not frame a fever'd dream,
But still the Douglas is the theme?
I'll dream no more: by manly mind
Not even in sleep is will resigned;
My midnight orisons said o'er,
I'll turn to rest and dream no more."

Before quitting the subject of dreams I will read you two of a most mysterious nature, which I am altogether unable to explain, and on which I shall be delighted if any of you can throw some light.

The truth of the first is vouched for by Dr. Carlyon, author of a work from which it is extracted, who had it from the main witness, and who adduces in attestation every particular of name, place, and date. It is entitled:

THE MURDER NEAR WODEBRIDGE.

On the evening of the eighth of February, 1840, Mr. Nevell Norway, a Cornish gentleman, was cruelly murdered by two brothers of the name of Lightfoot, on his way from Bodmin to Wodebridge, the place of his residence.

At that time his brother, Mr. Edmund Norway, was in the command of a merchant-vessel, the "Orient," on her voyage from Manilla to Cadiz, and the following is his own account, written down in his journal at the time, of a dream which he had on the night when his brother was murdered:—

Ship Orient, Feb. 8th, 1840.

About 7.30 p.m., the Island of St. Helena N.N.W., distant about 7 miles; shortened sail and rounded to with the ship's head to the eastward; at 8 set the watch and went below; wrote a letter to my brother, Nevell Norway. About 20 minutes or a quarter before ten went to bed. Fell asleep, and dreamt that I saw two men attack my brother and murder him. One caught the horse by the bridle and snapped a pistol twice, but I heard no report. He then struck him a blow, and he fell off the horse. They struck him several blows and dragged him across the road and left him. In my dream there was a house on the left hand side of the road. At 4 o'clock I was called and went on deck to take charge of the ship. I told the second officer, Mr. Henry Wren, that I had had a dreadful dream, viz., that my brother Nevell was murdered by two men on the road from St. Colomb to Wodebridge, but that I felt sure it could not be there as the house there would have been on the right hand side of the road; so that it must have been somewhere else. He replied, "Don't think anything about it. You west-country people are so superstitious. You will make yourself miserable the remainder of the voyage."

So much for the dream. Now for the confession of William Lightfoot, one of the assassins, who was executed together with his brother, April 13th, 1840. "I went to Bodmin last Saturday week the 8th instant (Feb. 8th, 1840), and in returning I met my brother James. It was dim like. We came on the turnpike road all the way till we came to the house near the spot where the murder was committed. We did not go into the house, but hid ourselves in a field. My brother knocked Mr. Norway down. He snapped a pistol at him twice, and it did not go off. He then knocked him down with the pistol. I was there along with him, Mr. Norway was struck while on horseback. We left the body in the water on the left side of the road coming to Wodebridge. My brother drew the body across the road to the watering."

I think you will agree with me that that is a very wonderful story. But the following is hardly less so: it is taken from a work by Dr. Bushnell: As I sat by the fire one stormy November night, in the parlour of an hotel in the Napa valley of California, there came in a most venerable and benignant looking person with his wife, taking their seats in the circle. The strangers, as I afterwards learnt, was Captain Yount, a man who came over into California as a trapper more than forty years ago. Here he has lived, acquiring an immense landed estate, and becoming a kind of acknowledged patriarch in

the country. The conversation turned, I know not how, on spiritualism; and he discovered a degree of inclination to believe in the reported mysteries. His wife intimated that probably he was predisposed to this kind of faith by a very peculiar experience of his own, and evidently desired that he might be drawn out by some questions on the subject. At my request he gave me his story. About six or seven years previously, in a mid winter's night, he had a dream in which he saw what appeared to be a company of emigrants arrested by the snows of the mountains and perishing rapidly by cold and hunger. He noted the very cast of the scenery, marked by a huge perpendicular front of white rock cliff; he saw the men cutting off what appeared to be tree-tops, rising out of deep gulfs of snow; he distinguished the very features of the persons, and the look of their particular distress. He woke profoundly impressed with the distinctness and apparent reality of his dream. At length he fell asleep and dreamed exactly the same dream again. In the morning he could not expel it from his mind. Falling in shortly with an old comrade, he related it to him, and was only the more deeply impressed by his recognizing without hesitation the scenery of the dream. This comrade had come over the Sienna by the Carson Valley pass, and declared that a spot in the Pass answered exactly to his description. By this the Patriarch was decided. He immediately collected a company of men with mules and blankets and all necessary provisions. The men were sent into the mountains, one hundred and fifty miles distant, directly to the Carson Valley Pass. And there they found the company in exactly the condition of the dream, and brought in the remnant alive. Dr. Bushnell adds that he found the Californians everywhere ready to second the old man's testimony.

This part of my subject leads me to say what I think on the subject of so-called prophetic dreams. No belief, perhaps, is so old as the belief in this class of dreams. All the greatest classical writers of antiquity swarm with supposed instances of them. So do the legendary writers of the middle ages. Baxter, I believe, built an argument upon them to the effect that dreams are occasioned by good or bad spirits whispering in the sleeper's ear. My own opinion on the matter I may best illustrate by an old story. A somewhat sceptical philospher went to visit a celebrated temple dedicated to the Pagan god of the sea. The priest was loud in his praises of the power of the deity: "See," he exclaimed, pointing to the walls of the temple, "here are all the votive tablets of shipwrecked mariners who have prayed to the god and have been saved." "Most true," replied the philosopher, "but I should like to see the votive tablets of those who have prayed to the god, and have *not* been saved." I sympathize with the philosopher. We have abundant calculations of the prophetic dreams which *have* come true: I should like to see calculations of the prophetic dreams which have *not* come true.

Perhaps some of you may not be aware that certain ingenious writers in old times framed a complete system for the interpretation of dreams which is chiefly remarkable from an historical point of view and on account of the wonderful principles on which it is framed. For instance to dream that you play upon bagpipes signifies trouble and contention: happily such dreams are not likely to occur to any but Scotchmen. To dream that you have on boots beautifully cleaned and polished signifies honour and profit at the hands of the servant who cleaned them: this fact ought certainly to be communicated to Mr. William Chandler. On the principle that it is an ill wind which blows nobody any good, we learn that it is an extremely favourable omen to dream that one is a fool. My piscatorial friends will be interested to learn that to dream of fish in the sea is not good, but to dream of fish on land is good because then they can do no harm, but rather, being cooked and eaten, may do much good. The most marvellous interpretations, however, are those connected with dreams about noses: to dream one has a fair and great nose is good to all; for it signifies subtlety of sense and acquaintance with great personages. If any one dreams his nose is longer than ordinary, he will become rich and powerful, provident and subtle. To dream that one has two noses signifies discord and quarrels, especially with one's domestic kindred. And finally, if any one dreams that his nose is grown so big as to be hideous to the sight, he will live in prosperity and abundance, but never gain the love of the people.

So much for dreams—but I am anxious not to pass over unnoticed an interesting phase of sleep life, somnambulism. Somnambulism (says Dr. Carpenter) differs from ordinary dreaming in the two following points. In the first place the train of thought is more under the direction of sensations derived from without; and secondly, the muscular system, that is, the system by which we walk and move, is so completely under the control of the mind as not merely to give expression to its emotions, but also to act in answer to the will; that is, whatever we wish to do in our dreams, that we actually do. We have already noticed that in our dreams we have no control over our thoughts: fancies shape themselves as they will without any active intervention of our own and this would seem to be the case in somnambulism also. But in one important respect dreaming differs from somnambulism, because, in the latter, our fancies are not as wild and incoherent as in the latter. On the contrary reasoning processes are often carried out with extraordinary clearness and correctness. An instance of this is given by Abercrombie: "A distinguished lawyer had been consulted respecting a case of great importance and much difficulty, and he had been studying it with intense anxiety and attention. After several days had been occupied in this manner he was observed by his wife to rise from bed during the night, and go to a writing-desk which stood in the bedroom. He then sat down and

wrote a long paper which he carefully put by in the desk, and returned to bed. The following morning he told his wife he had had a most interesting dream; that he had dreamed of delivering a clear and luminous opinion respecting a case which had exceedingly perplexed him, and that he would give anything to recover the train of thought which had passed before him in his sleep. She then directed him to the writing-desk, when he found the opinion clearly and fully written out. It was afterwards found to be perfectly correct.

A somewhat similar story is told of a young French ecclesiastic who was in the habit of getting up during the night in a state of somnambulism, of going to his room, taking pen, ink, and paper, and composing and writing sermons. When he had finished one page of the paper on which he was writing, he would read over aloud what he had written and correct it. In order to ascertain whether the somnambulist made use of his eyes, the Archbishop held a piece of pasteboard under his chin to prevent him from seeing the paper upon which he was writing; but he continued to write on without being apparently incommoded in the slightest degree.

I have not in any medical work discovered any statement of the general laws which govern somnambulism. The only three I have myself discovered which can be said to have any general application, are the following:

1. The activity of the most important of the senses, viz., the sense of sight, is completely dormant; we see, but not with our bodily eyes. In this, of course, it resembles dreaming, but with an important difference: the dreamer has no communication with the objects of the external world, whereas the somnambulist has. As in the story of the young French ecclesiastic which I have just read, he found his pen and ink, wrote his sermon, read it over, corrected it, and did all this by means of a kind of mental sight unassisted by his bodily eyes.
2. It would seem to be a habit, not a freak which happens now and then, but a condition which is permanent. A somnambulist does not walk once in one year and another time in the next: his somnambulism is periodical, and recurs pretty regularly at certain periods. In this it greatly resembles a cognate phenomenon, viz., talking in one's sleep. No doubt there are exceptions to this rule; for instance, this half a distinguished member of my House found himself in the middle of my room in the small hours of the night, and told me the following morning that he was never conscious of having walked in his sleep before. But this (as far as I can judge) is distinctly an exception, quite opposed to all the rules of correct somnambulism.
3. Somnambulism would seem to be connected with certain conditions of the body, being much more common in bad health than in perfectly good health. In this respect it would seem to follow the laws which govern

dreams: we are much more disposed to dream when we are ill than when we are well, and nothing tends so surely to produce nightmare as a somewhat unwonted consumption of one of Mr. Duck's excellent cakes.

The two following stories will illustrate this third law which I have laid down. The first case is that of an Italian nobleman, dark, thin, cold-blooded, addicted to the study of the abstract sciences. His attacks occurred at the waning of the moon, and were stronger in autumn and winter than in the summer. An eye-witness gives the following account:—

"One evening towards the end of October we played at various games after dinner; Signor Augustin took a part in them together with the rest of the company, and afterwards retired to rest. At 11 o'clock his servant told us that his master would walk that night, and that we might come and watch him. I examined him after some time with a candle in my hand. He was lying upon his back and sleeping, with open, staring, unmoved eyes. We were told that this was a sure sign that he would walk in his sleep. I felt his hands and found them extremely cold, and his pulse beat so slowly that his blood appeared not to circulate. We played at backgammon till the spectacle began. It was about midnight when Signor Augustin drew aside the bed-curtains with violence, arose, and put on his clothes. I went up to him and held the light under his eyes, he took no notice of it although his eyes were open. Before he put on his hat, he fastened on his sword-belt which hung on the bed-post: the sword had been removed. Signor Augustin then went in and out of several rooms, approached the fire, warmed himself in an arm-chair, and went thence into a closet where was his wardrobe. He sought something in it, put all the things into disorder, and having set them right again, locked the door and put the key into his pocket. He went to the door of the room, opened it, and stepped out on the staircase. When he came below one of us made a noise by accident; he appeared frightened and hastened his steps. His servant desired us to move softly and not to speak or he would become out of his mind: and sometimes, if the least noise were made by those standing round him, he ran as if he were pursued. He then went into a large court and into the stable, stroked his horse, bridled it, and looked for a saddle to put on it. As he did not find it in the accustomed place he appeared confused. He then mounted his horse and galloped to the house door, he found this shut, dismounted and knocked with a stone, which he picked up at the door. After many unsuccessful efforts he remounted, and led his horse to the watering place which was at the other end of the court, let him drink, tied him to a post, and went quietly to the house. Upon hearing a noise which the servants made in the kitchen, he listened attentively, went to the door and held his ear to the keyhole. After some time he went to the other side, and into a parlour in which was a billiard table; he walked round it several times, and

acted the motions of a player. He then went to a harpischord on which he was accustomed to practise, and played a few irregular airs. After having moved about for two hours he went to his room and threw himself on his bed."

But the most remarkable story, which I have found, is one related by Abercrombie. A girl, aged 7 years, an orphan of the lowest rank, residing in the house of a farmer by whom she was employed in tending cattle, was accustomed to sleep in an apartment separated by a very thin partition from one which was frequently occupied by an itinerant fiddler. This person was a musician of considerable skill, and often spent a part of the night in performing pieces of a refined description. But his performance was not taken notice of by the child except as a disagreeable noise. After a residence of six months in this family she fell into bad health, and was removed to the house of a benevolent lady, where, on her recovery after a protracted illness, she was employed as a servant. Some years after she came to reside with this lady, the most beautiful music was often heard in the house during the night, which excited no small interest and wonder in the family; and many a waking hour was spent in endeavours to discover the invisible minstrel. At length the sound was traced to the sleeping room of the girl, who was found fast asleep, but uttering from her lips a sound exactly resembling the sweetest sound of a small violin. On further observation it was found that after being about two hours in bed, she became restless and began to mutter to herself; she then uttered sounds precisely resembling the tuning of a violin, and at length, after some prelude, dashed off into elaborate pieces of music, which she performed in a clear and accurate manner, and with a sound exactly resembling the most delicate modulations of that instrument. During the performance she sometimes stopped, made the sound of re-tuning her instrument, and then began where she had stopped in the most correct manner. The paroxysms occurred at regular intervals, varying from one to fourteen or even twenty nights, and they were generally followed by a degree of fever, and pains in various parts of her body. After a year or two her music was not confined to the imitation of the violin, but was often exchanged for that of a piano of a very old description which she was accustomed to hear in the house where she now lived; and she then also began to sing, imitating exactly the voices of several ladies of the family. In another year from this time she began to talk a great deal in her sleep, in which she seemed to fancy herself instructing a younger companion. She often descanted with the utmost fluency and correctness on a variety of topics, both political and religious. In these discussions she showed the most wonderful discrimination, often combined with sarcasm and astonishing powers of mimicry. Her language through the whole was fluent and correct, and her illustrations often forcible and even eloquent. During the whole period of this remarkable

affection, (which seems to have gone on for at least ten or eleven years), she was when awake a dull, awkward girl, very slow in receiving any kind of instruction, and in point of intellect she was much inferior to the other servants of the family.

A remarkable parallel to this story fell under my own experience. In my House at Rugby there was a fellow in the Upper IVth, dull and rather lethargic, who in the middle of one half astonished the members of his Dormitory by his vagaries during his sleep. The stories which were told by those who were in his Dormitory so excited the curiosity of the other members of the House that there was a general rush in the evening to visit the favoured Dormitory. The Prefect of the Dormitory, who was also the head of the House, resolved, with a prudent eye to business, to combine charity with sight-seeing, and therefore announced that in future any one who was admitted into his Dormitory to see the somnambulist should pay the sum of sixpence, the proceeds to be devoted to the fund for the Lancashire Distress. I was not at Rugby at the time, but on going down to stay there after the end of the Oxford term I received full and circumstantial accounts from all the members of the House of this wonderful spectacle. The most remarkable point about it was that Jones the Somnambulist could be engaged in a regular connected conversation, seeming to hear and understand the questions which were put to him. Though in his waking life he used to be remarkably quiet, when in his exalted sleep he poured forth a flood of sarcastic and impassioned words, delighting especially in heaping ridicule upon his Form master, his House master, and the principal members of the school. He would do when in this condition anything he was told: one malicious friend persuaded him that a piece of yellow soap was a piece of Turkish delight, whereupon Jones swallowed it down at a gulp, and was not a little astonished to find himself decidedly unwell the following morning. Another friend urged him to throw his pillow out of the window, which he promptly did before he could be stopped. This led to the termination of the nocturnal scenes, for the pillow, being picked up by the policeman and brought to the front door, led to enquiries being made. The result was that the House master removed Jones to a bedroom in his own part of the House, to the great disappointment of his friends and the visible detriment of the Lancashire distress fund. In this case it is noticeable that in spite of the noise made by those who came to see him, the questions that were put to him, and the occasional bursts of laughter from the bystanders, the Somnambulist never woke, and in the morning was perfectly unaware that his sleep had been other than peaceful and undisturbed.

In conclusion, I can assure you that I am only too conscious of the manifold imperfections of this paper, but I shall have fully attained my object in

writing it if I have at all enabled you to realize the words which the most splendid visionary, the most glorious dreamer in the world, puts into the mouth of his great magician

"We are such stuff
As dreams are made of, and our little life
Is rounded with a sleep."

The President announced the election of H. C. Tillard and H. H. Phear as Members.

There were 80 persons present, 3 Hon. Members, 35 Members, 3 Associates and 39 Visitors.

MEETING HELD JUNE 2ND, 1871.

The minutes of the previous meeting were read and confirmed.

In the absence of the President the chair was taken by C. M. Bull, Esq.

Geology.—H. J. Verrall exhibited a species of *Lima* from Bink Knoll, and some fossils from Shanklin, presented by F. E. Hulme, Esq., F.L.S.

Entomology.— J. B. Fuller passed round a list of notices, and exhibited a specimen of *Acronycta Alni*, reared by E. Meyrick.

Ornithology.—E. L. Hesketh passed round a list of notices.

W. D. Fenning exhibited two cases of birds, lent by F. J. H. Jenkinson.

Archæology.—A. C. Champneys exhibited some rubbings of brasses; one from Charlton of the beginning of the 16th century; one from St. John's, Devizes, of 1630; and one of a knight in armour from Bromham of 1516.

H. J. Verrall exhibited two Japanese bows and a quiver, lent by the Rev. J. Sowerby.

Botany.—W. D. Fenning announced the discovery of *Camelina sativa*, by D. Lysons, and mentioned the backwardness of plants generally.

The following paper was then read by F. J. H. Jenkinson, on

THE SCILLY ISLANDS.

Due S.W. from the Land's-End, separated from it by twenty-five miles of rough and chopping sea, lie the group of rocks and islands known as the Scilly Islands. The derivation of the name is very uncertain, and many theories have been broached; but, not to bore my hearers with far-fetched and often obscure etymologies, I may tell you that the most probable seems to be from *silsa*, a conger, because these fish are very abundant there, attaining a length of six feet and, I believe, sometimes even more.

The islands are now very easy of access; twelve hours in the night mail train takes you from London to Penzance without a single change. At Penzance you arrive in good time for the packet, which goes there and back three times a week in summer, and twice a week in winter. Should you have any time to spare at Penzance, you may, if ornithologically inclined, pay a visit to one Mr. Vingoe, a naturalist, whose collection of birds, many of the rarest being shot by himself, is well worth seeing. Or, if you are an archæologist, you may go to see S. Michael's Mount, which is supposed to be the Ictis, where the Phœnicians took on board their cargoes of tin. On the top is the castle or abbey, which was founded previous to the year 1044, being a sort of colony from the other Mount St. Michael, in Normandy; so early, however, as the middle of the 5th century the Mount is said to have been regarded with religious reverence. In the middle ages it was much resorted to as a place of pilgrimage, it was also regarded as a stronghold, the castle part of the building dating from this period. In the wars of the Roses, and several times subsequently, it was held for short periods by different parties.

The Mount is about 200 feet high, composed entirely of granite, and was long believed to have been originally surrounded with forest, insomuch that Carew and, still earlier, William of Worcester assert that it was called "The Hoar Rock in the Wood." This would mean that since it has been inhabited, the country has been swallowed up, over a large area, by the sea: but geology makes this seem impossible. How then did the mistake arise? I have said that the priory was founded as an offshoot from the Mount in Normandy. Now this Mount was certainly once surrounded by a dense forest; and the way in which Max Mueller disposes of the difficulty is by supposing that some document referring to the Norman Mount was kept in the Cornish priory, and mistaken by William of Worcester for one relating to the Cornish Mount. This explanation seems very satisfactory, and is borne out by various arguments which I cannot here bring in. I thought this mention of a place, which thrusts itself on our notice as we pass, worthy of a short digression.

The sea-voyage is forty miles from pier to pier, and takes from three and a half to five, and in very bad weather seven hours. All the while you are steaming over the land, now buried by the sea, where,

"All day long the noise of battle roll'd
Among the mountains by the winter sea;
Until King Arthur's table, man by man,
Had fallen in Lyonness about their Lord,
King Arthur."

Yes—what is now rolled over by forty fathoms of boisterous water, was then a smiling landscape, with trees and fields and population enough to fill one hundred and forty churches. It was over this ground that the remnants of that chivalrous band fled in disorder, until the sea burst in upon their pursuers, and left them upon an island, erst part of the mainland, there to spend their old age in thinking on the glory that had been theirs.

As you are about half-way across you will see to the S.E., at a greater or less distance according to the state of the tides, the new light-house on the Wolf-rock. It is a beautiful building, and forms a useful landmark for coasters and homeward bound vessels: its light shows alternately red and white. The rock itself is just above high-water mark; it is very hard, and rises very abruptly from a considerable depth.

A little farther on is visible, to the N.W., the lightship that is moored over a dangerous reef called the "Seven Stones." The main part of this reef is called the "town," and may be the traditional site of the capital of Lyonness.

I will now pass on to the islands themselves. They are altogether about 30 miles in circumference, surrounded by deep water; but between the islands the water is very shallow, and in several places large flats of sand are laid bare at low water, a rich field for the shell collector. Here may be found the Pinna, a transparent triangular bivalve, nine or ten inches long, and half as broad, which occurs in places where a sedgy kind of sea-weed grows thickly like grass; a small portion only of the shell appears above the surface. The way to find them is curious and somewhat unpleasant: you must take off your shoes, which would break them, and walk about barefoot till you feel the sharp edge under your foot; even with bare feet, if you tread hard, you will cut your foot and break the shell. When you have been so lucky as to hit on one, you must dig it out carefully with your fingers—this will be no easy matter, as it is tightly moored by a silken byssus or beard, which is woven in among the roots of the sedge. This beard, when dried, is a most beautiful object, being as fine as raw silk and quite as strong. Probably as you pace about you will hear a "squelch," (I know no other word to express it), close behind you, or see a jet of water glitter for a moment in the sun. Keep your eye on the place and, if you do not find the creature at once, look out for the next eruption. You will find these jets caused by two kinds of Fan-shells, Scallops or Pectens, one large, having one valve convex and the other flat, the animal

of which comes next to the oyster in flavour; the other smaller and with both shells convex or bulging, and beautifully marked, well worth finding and putting in your collection of shells. But see! the tide is coming back, and you must take care not to be cut off, for on these level sands there are some creeks, up which the sea may hasten and leave you on an island. You should, therefore, have a boat ready to take you up anywhere, and then you will have time to hunt for the many shells that come out of the sand to greet the returning water. Walk then, of course barefoot, just by the edge of the water, and every minute you will see a crack, or a bump, or a squirt, according to the nature of the shell that is below. If a squirt, it is probably a razorfish, and you will have to dig hard to catch it, for it pierces through the sand at an astonishing pace. Its form is well adapted for this work, being that of a narrow cylinder: the animal drives out a wedge-shaped foot, then, by a muscular action, enlarges the end into a knob, then shortens the foot, when, the knob holding its place in the sand, the shell is pulled forward. If you get many of these remember that, minced, they make nice patties. I have thought these and similar directions might prove useful, as they will apply to many similar sands which you are likely to visit.

Not far from these sands is a tall rock, called Hedge Rock, on which herons may be always seen, which is a curious circumstance; but still more curious is the fact that they never breed there. We are, therefore, led to suppose that the birds seen there in summer are birds one year old, and that the heron does not breed till it is two years old. This rock is overgrown with beautiful large *Mallows*, whose purple-red flowers look very pretty from the sea. All over the islands you will see in great numbers a black bird, as large as a small goose, with a long neck and long sharp bill. These are the Cormorants. On every rock may they be seen in troops, some with their heads down, pruning their feathers, some with necks and wings outstretched to dry in the sun or wind. As the tide falls they scatter for the most part and fish singly or nearly so; but if they fall in with a good shoal of sprats, a gathering takes place, and I have seen upwards of two hundred floating together, now one and now another bobbing down to catch their finny prey. They are wonderful swimmers and divers, catching fish in their own element with the greatest ease by simply running them down. Another bird common at Scilly is the Manx Shearwater, a large kind of petrel; it builds in holes in the ground, and lays one brilliant white egg. Woe to the mischievous person who seeks to rob the hole of its precious contents—for the bill of the parent bird, though not so conspicuous and razorlike as that of the Puffin, can yet inflict a most painful wound.

The only hawk resident at Scilly is the kestrel, which is very common: one always roosts under the eaves of the Lord-Proprietor's house. The

peregrine was a regular resident, breeding annually on a steep pile of rock, rising like a pillar out of the sea: it may still live there, but I believe it has left the islands. Crows are very common and very mischievous. Rooks come over, every now and then, in flocks, and generally stay a short time; but, for some reason, invariably, sooner or later, return to the mainland; even young ones reared from the egg refuse to stay.

Nearly all the warblers, which are summer visitors in England, are autumn visitors at Scilly. They seem in their southward autumnal migration to keep to the land as long as possible. Thus they become concentrated more and more as they approach the southwest, and, I believe, nearly all break their journey at Scilly. The autumn is the time to be there for birds; many of our rarest sandpipers then come in. Last year for instance, three rare sandpipers occurred, which, breeding as they do only in the extreme north of America, must have flown down Greenland by mistake, and thence by Iceland, Faroe, &c., have kept the west coast and so reached Scilly.

The chiffchaff, which in Wiltshire is the harbinger of spring, generally stays through the warm Scillonian winter. Snow and frost are almost unknown, last winter being the first for many years that ice had been seen, and then it was mere cats'-ice.

Snipes and woodcocks are fairly plentiful: 24½ couple is the largest bag on record of snipe, and 6½ couple of woodcock. Both these bags were made by one gun, both were under unfavourable circumstances, and both formed only part of mixed bags of pheasants, ducks, etc.

Wigeon generally show in a flock of about two hundred on a pool close to the house, where they are not allowed to be molested. This pool is about half a mile long and a furlong across, and is crowded with fine tench and eels.

Quails appeared last year in considerable numbers: they were first heard calling early in August, and being easy to shoot and delicious to eat, several were shot during that and the following month. The Corncrake or Landrail breeds at Scilly, but its numbers are augmented in the Autumn, when eight couple have been killed by one gun. I will here relate a curious trait with regard to the Landrail, which may astonish some of those who wonder how so feeble a bird can migrate over the Channel. The bird I speak of was flushed by a dog from a cairn, or heap of rocks near the sea. It flew straight away and settled on the sea, where it swam with all the ease and grace of a Water-rail; its fate was curious. After one unsuccessful shot, a Snider bullet at 40 yards ended its life, blowing off the back of its head, but not otherwise injuring it. On another occasion a Landrail, flushed some distance from the sea, where there was plenty of cover, flew deliberately down among the wet seaweed close to the flowing tide, and could not be

found for some time: when found, it started across the water, but a shot precluded the possibility of observing its intentions further. There is one characteristic family of birds which must not be omitted, I mean the Terns or Sea Swallows. These beautiful birds, two species of which, the common Tern and the black Tern, (young) are in the case on the table, have a beautiful easy flapping flight, for which their enormously long wings are admirably adapted. Anon they hover over the water, when they see, or think they see, a dainty morsel floating; then dart headlong upon it, splashing the water in bright spray around, and seldom rise unsuccessful. Four kinds breed at Scilly; they are all similar in their habits, nests they care not to build; a tuft or two of seapink confines their three or four richly-spotted eggs, arranged methodically with their points together, so as to occupy the least possible space. Outside the islands, seldom coming within the land save in the wildest weather, may be seen the Gannet, or Solan Goose, soaring aloft and plunging like a large Tern into the sea upon its prey; and such is the force with which it descends, that seamen, by setting a plank in the water with a herring fastened to it, cause the Gannet to break its own neck. I might go on much longer on the subject of birds, but I wish to glance at the Entomology and Flora of the islands. The common butterflies there are the Clouded Yellow, the pale variety being not uncommon, the Painted Lady, Red Admiral, small Tortoiseshell, Common Blue, and Meadow Brown. The Peacock is not so common, the Humming-bird Hawk Moth is abundant nearly all the year round, the convolvular Hawk Moth has occurred, the Death's-Head is not uncommon; one I have, was caught about sixty miles out at sea, and presented to me in a bottle of gin: the fire and relaxing-box soon brought it into better shape. The six-spot Burnet is the last of the short list of Scillonian *Sphyngina*.

Of *Bombycina* I have met with very few, including the common Tiger, Ruby Tiger, White Ermine, and Buff Ermine.

The *Noctuina* are as every entomologist knows, so shy in their movements, that a complete list requires long and careful collection in the neighbourhood. Both they and the *Geometrina* are represented pretty well at Scilly, but I will not descend into particulars. Of *Micro-lepidoptera* I never had time to make many observations; for if you do come upon a Tinea unknown to you, it takes some time to identify it.

I shall not say much about the wild flowers of the islands, being quite ignorant of Botany: but I have no doubt there are many peculiar plants for anyone who knows them. There are some however that must strike the most casual observer. Sandy places by the sea are clothed with Sea Holly (Eryngo), whose bluish-lilac flowers are the resort of many bees and other honey-loving insects; in such places also are found the Wild Carrot, the beautiful twin-hued Sea-Convolvulus, the Sea Spurge, and others whose

names I do not know. On the cliffs Sea-pink and *Asplenium Marinum*, the Sea Spleenwort, abound, though this latter grows finest in a well some way from the shore. In the moors *Osmunda Regalis* grows profusely, and on the downs, the Lady's Tresses, a beautiful little Orchis, which many of you have doubtless seen on our Wiltshire Uplands. Fern, furze, and heather, grow on all uncultivated ground, and the fluffy Cotton-grass in all the marshes.

The attraction, however, to Botanists must always be the Abbey Gardens. Here may be seen in the open air, tall hedges of fuschia, and tall bushes of geranium. A witty Islander, being laughed at because there were no trees for firewood, replied, "No need for them, while we have faggots of geranium." Aloes too are here, five or six being generally in blossom every year. Figs and apples ripen with equal ease; but cherries, currants, plums, &c., requiring a colder winter and hot summer, will not answer. And by no means the least pleasing feature of these gardens is that amongst the quaint and unaccustomed forms of Dracænas, Yuccas, Pitispirum, and other exotic shrubs and trees may be discerned many of our own native or common garden flowers. Veronicas and myrtles seed themselves about the garden, and one of the prettiest places is a circle of wire arches covered by the common hop, and forming a pleasant shady walk. Various kinds of Mesembrianthemums form beds wherever a single seed has fallen, showing a soft green cushion of succulent leaves, studded with yellowish and pink starry flowers. And now, hoping to have at least awakened some curiosity for these slightly known and beautiful islets, I lay down my pen, passing over many things that might be interesting, and leaving quite untouched what I had intended to say more about, the geology and antiquities of Scilly. And, should any feel dissatisfied with the disorderly and superficial character of this paper, let him be lenient—for I had short notice, and the spare time of one day is but a little time for so great a subject.

A. C. Champneys then gave an account of some of the neighbouring churches.

There were 58 persons present: 2 Honorary Members, 29 Members, and 22 Visitors.

MEETING HELD JUNE 17TH, 1871.

The minutes of the previous meeting were read and confirmed.

Dr. Fergus then gave a lecture on Chlorine, illustrated by numerous experiments.

The meeting broke up at 11 o'clock.

The President announced the expulsion of C. W. Haughton from the Society.

There were 71 persons present: 2 Honorary Members, 36 Members, 2 Associates, and 31 Visitors.

MEETING HELD JUNE 23RD, 1871.

This was a private meeting held to elect a Secretary, and to transact other business.

A. C. Champneys was elected Secretary.

The President made a statement of accounts, and showed that as the Garden and Museum were necessarily the cause of much extra expense, larger subscriptions were necessary.

After some discussion, it was decided:—

1.—That Members should not in future be entitled to a copy of the Report gratis.

2.—That for the future the Subscription for Honorary Members should be 5s., and the composition 2 guineas; but that the subscription of present Honorary Members should not necessarily be raised.

The President proposed a vote of thanks to W. D. Fenning for his past services as Secretary, which was unanimously passed.

There were 38 persons present, 2 Honorary Members, and 36 Members.

ENTOMOLOGICAL NOTICES.

Names of those whose Initials occur in the following List :—

H.R.A.	...	...	H. R. Armstrong.
C.F.H.B.	...	...	C. F. H. Bagot.
H.F.B.	...	...	H. F. Boyd.
A.C.C.	...	...	A. C. Champneys.
R.W.D.	...	...	R. W. Doyne.
J.W.D.	...	...	J. W. Dudding.
H.L.F.	...	...	H. L. Fanshawe.
W.D.F.	...	...	W. D. Fenning.
J.B.F.	...	...	J. B. Fuller.
F.W.G.	...	...	F. W. Giles.
C.L.D.G.	...	...	C. L. Des Gray.
E.L.H.	...	...	E. L. Hesketh.
P.L.H.	...	...	P. L. Hesketh.
E.H....	...	...	E. Hunter.
R.A.I.	...	...	R. A. Illingworth.
F.J.H.J.	...	...	F. J. H. Jenkinson.
C.V.K.	...	...	C. V. Knightley.
G.P.L.	...	...	G. P. Lefroy.
F.P.L.	..	...	F. P. Lefroy.
A.P.M.	...	...	A. P. Macgregor.
W.M....	...	...	W. Mansell, Esq.
G.C.M.	...	...	G. C. Mansel.
E.M. ...	...	...	E. Meyrick.
E.Mi....	...	...	E. Millais.
C.A.O.	...	...	C. A. Ogle.
C.S.P.	...	...	C. S. Peach.
G.H.P.	...	...	G. H. Perry.
H.S.S.	...	...	H. S. Sankey.
A.H.G.S.	...	...	A. H. G. Skrine.
J.G.S.	...	...	J. G. Simpkinson.
J.S. ...	...	...	Rev. J. Sowerby.
A.J.S...	...	...	A. J. Spencer.
J.S.T....	...	...	Rev. J. S. Thomas.
H.J.V.	...	...	H. J. Verrall.
W.H.W.	...	...	W. H. Williams.

The numbers before the species refer to Stainton's "Manual."
Hybernated specimens are indicated by the letter H.

RHOPALOCERA.

2	Gonepteryx Rhamni	March 2, J.S.T.
6	Pieris Brassicæ	*April 28, G.H.P.
7	P. Rapæ	April 3, G.H.P.
8	P. Napi	April 17, W.H.W.
10	Anthocharis Cardamines	April 30, G.P.L.
14	Lasiommata Megæra	May 12, J.S.
22	Cœnonympha Pamphilus	May 12, W.D.F.
26	Vanessa Atalanta	March 3, C.S.P.; E.H.
27	V. Io	March 19, R.A.I.
29	V. Polychloros	April 8, E.M.
30	V. Urticæ	March 2, W.H.W.
36	Argynnis Selene	June 10, J.B.F.
37	A. Euphrosyne	May 12, J.S.
41	Nemeobius Lucina	May 26, E.L.H.
46	Thecla Rubi	May 29, E.M.
47	Chrysophanus Phlæas	May 11, G.C.M.
51	Polyommatus Argiolus	Ramsbury, April 8, E.M. (Manton, April 24, F.J.H.J.)
56	P. Alexis	May 20, A.H.G.S.
58	P. Agestis	May 15.
60	Thymele Alveolus	May 12, F.J.H.J.
61	Thanaos Tages	May 7, E.H.
65	Pamphila Sylvanus	May 29, E.M.

HETEROCERA.

73	Smerinthus Ocellatus	May 6, A.P.M.
75	S. Tiliæ	June 10, C.L.D.G.
78	Sphinx Ligustri	June 22, J.W.D.
86	Chærocampa Porcellus	June 10, G.C.M.
87	Macroglossa Stellatarum	March 7, H.S.S.
89	Sesia Fuciformis	May 28, W.M.
104	Hepialus Lupulinus	May 25, J.B.F.
105	H. Humuli	June 11, H.L.F.
107	H. Sylvinus	June 10, J.B.F.
129	Diloba Cæruleocephala	larva June, E.M.
158	Gnophria Rubricollis	June 1, E.M.

* A specimen *seen* by W.H.W. on March 24, on which day white butterflies were also seen by F.P.L. and F.W.G.

165	Arctia Caja	larva April 23, F.J.H.J.
168	Phragmatobia Fuliginosa	May 2, P.L.H.
169	Spilosoma Menthrasti	May 21, F.J.H.J:
171	S. Lubricepeda	June 7, F.J.H.J.
172	Diaphora Mendica...	May 20, J.G.S.
179	Lasiocampa Quercus	larvæ June —
185	Odonestis Potatoria	June 10, C.A.O.
186	Gastropacha Quercifolia	larva June 25, F.P.L.
190	Cilix Spinula	May 25, C.V.K.
195	Drepana Unguicula	May 2, G.C.M.
222	Acronycta Alni	(bud) May 31, E.M.
224	A. Rumicis	May 21, F.J.H.J.
261	Xylophasia Polyodon	June 18, E.M.
268	Neuria Saponariæ	June 16 (?), E.M.
281	Mamestra Brassicæ	May 31, F.J.H.J.
283	Apamea Basilinea	June 22, F.J.H.J.
297	Grammesia Trilinea	June 22, F.J.H.J.
310	Agrotis Segetum	about June 20, F.J.H.J.
312	A. Exclamationis	June 19, E.M.
333	Triphæna Pronuba...	May 30, J.B.F.
354	Tæniocampa Gothica	March 20, W.M.
364	T. Cruda	March 21, E.Mi.
357	T. Instabilis	March 26, F.J.H.J.
360	T. Stabilis	March 24, F.J.H.J.
418	Aplecta Nebulosa	June 24, E.M.
426	Hadena Dentina	June 24, E.M.
484	Amphipyra Pyramidea	larva, E.M.
485	A. Tragopogonis	larva, E.M.
502	Rumia Cratægata	May 21, G.H.P.
509	Selenia Illunaria	March 26, C.F.H.B.; F.J.H.J.
510	S. Lunaria	June 26, F.P.L.
512	Odontopera Bidentata	about May 20, F.J.H.J.
526	Hemerophila Abruptaria	April 19, E.Mi.
530	Boarmia Repandata	June 15, A.J.S.
553	Iodis Lactearia	May 26, P.L.H.
564	Asthena Candidata	May 15, E.M.
586	A. Remutata	May 19, G.H.P.
591	A. Aversata	June 10, J.B.F.
596	Cabera Pusaria	May 30, G.H.P.
607	Strenia Clathrata	May 6, J.B.F.; F.J.H.J.
608	Lozogramma Petraria	May 20, E.M.

625 Ligdia Adustata ... ... May 30, J.B.F.
626 Lomaspilis Marginata ... ... May 17, F.J.H.J.
628 Hibernia Rupicapraria ... . Feb. 22, W.M.
629 H. Leucophearia ... ... March 4, E.L.H.
631 H. Progemmaria ... ... March 25, W.M.
633 Anisopteryx Æscularia ... ... March 18, F.J.H.J.
640 Larentia Multistrigana ... .. March 23rd, F.W.G.; R.W.D.
645 L. Miaria ... ... June 24, E.M.
658 Eupithecia Castigata ... ... May 7, E.L.H.
715 Melanippe Biriviata ... . May 7, F.J.H.J.
716 M. Montanata ... ... May 15, W.M.
718 M. Fluctuata ... ... April 14, A.C.C.; F.J.H.J.
720 Anticlea Rubidata... ... ... June 18, F.J.H.J.
721 A. Badiata ... ... Mar. 24, W.H.W.; May 7, F.J.H.J.
726 Coremia Ferrugaria ... ... May 6, H.J.V.
737 Scotosia Dubitata ... ... April 16, F.J.H.J.
745 Cidaria Corylata ... ... May 30, J.B.F.
765 Anaitis Plagiaria ... ... May 26, E.L.H.
769 Odezia Chærophyllata ... ... June 2, J.P.L.
779 Herminia Barbalis... ... ... May 28, F.J.H.J.
781 H. Nemoralis ... ... June 15, F.J.H.J.
794 Herbula Cespitalis... ... ... April 7, F.J.H.J.
804 Paraponyx Stratiotata ... ... June 17, F.J.H.J.
821 Pionea Forficalis ... ... May 20, F.J.H.J.
844 Endorea pyralella ... ... May 19, G.H.P.
829 Scopula Olivalis ... ... June 18, J.W.D.
830 S. Prunalis ... ... June 18, F.J.H.J.
1294 Adela viridella ... ... May 6, F.J.H.J.
1902 Alucita Polydactyla ... ... March 25.
1890 Pterophorus pterodactylus ... ... May, F.J.H.J.
1896 P. Galactodactylus ... ... larva May, F.J.H.J.

ORNITHOLOGICAL NOTICES.

The notices this year are all rather earlier than usual. The Barbary Partridge has never before been recorded as appearing at Marlborough, but one nest has been found this year at Rabley copse by Mr. Rushen. The goatsucker's nest has only once before been taken here, in 1865; and the Quail's nest has been found, though it does not often appear in our list.

Names of those whose Initials occur in the following list.

W. C. A. ... ... W. C. Adams.
G. H. A. ... ... G. H. Alston.
E. F. H. B. ... ... E. F. H. Bagot.
F. W. L. B. ... ... F. W. L. Birdwood.
A. B. ... ... A. Busk.
G. T. P. C. ... ... G. T. P. Cambridge.
J. M. L. D. ... ... J. M. L. Davies.
W. H. D. ... ... W. H. Dobie.
S. E. V. F. ... ... S. E. V. Filleul.
J. H. F. ... ... J. H. Forster.
J. B. F. ... ... J. B. Fuller.
F. W. G. ... ... F. W. Giles.
C. F. H. ... ... C. F. Harrison.
E. L. H. ... ... E. L. Hesketh.
P. L. H. ... ... P. L. Hesketh.
J. H. ... ... J. Higginson.
A. H. J. ... ... A. H. James.
F. J. H. J. ... ... F. J. H. Jenkinson.
G. L. ... ... G. Laird.
J. B. K. ... ... J. B. Kite.
G. E. M. ... ... G. E. Mew.
F. M. ... ... F. Mew.
E. M. ... ... E. Millais.
L. N. ... ... L. Napier.
G. N. ... ... G. Nares.
J. B. O. ... ... J. B. Oakeley.
H. G. P. ... ... Mr. H. G. Parker.
L. P. ... ... L. Pelly.
C. H. S. ... ... C. H. Skrine.
S. J. S. ... ... S. J. Soady.
E. H. T. ... ... E. H. Topham.
S. F. T. ... ... S. F. Townsend.
A. E. T. ... ... A. E. Townsend.
W. H. W. ... ... W. H. Williams.

Kestrel	Ap. 10, E.H.T.
Sparrow Hawk	May 12, E.L.H.
Long-eared Owl	2 eggs Mar.25,J.B.O. & S.E.V.F.
Tawny Owl ...	Mar. 19, L.P.
Red-backed Shrike	2 eggs June 3,C.H.S.
Spotted Flycatcher	June 10, E.M.
Missel Thrush...	Mar. 27, S.E.V.F. Young Ap. 20, E.F.H.B. ;S.F.T.
Song Thrush ...	6 eggs Ap. 1, E.M. egg on June 26, S.J.S. and L.N.
Redwing	seen Ap.5,S.E.V.F.
Blackbird ...	2 eggs Mar. 27, S.E.V.F.
Hedge Accentor	Ap. 3, E.H.T.
Redbreast ...	4 eggs Ap. 7, J.B.O; S.E.V.F.
Redstart	2 eggs May 1 ,S.F.T.
Wheatear... ...	seen Mar. 9,W.C.A. 3 eggs May 1, A.B.
Grasshopper Warbler ...	May 30, J.B.O.
Sedge Warbler	May 3, C.F.H.
Nightingale ...	several heard about April 24.
Blackcap... ...	heard March 25, J.B.F.; F.W.G.
Common Whitethroat	2 eggs May 13, J.H.
Willow Warbler	seen Ap.12,J.F.H.J. 11 eggs, May 18, G.N.
Chiff-chaff ...	heard Mar. 29, J.B.O.; S.E.V.F.
Great Tit... ...	Ap. 20, A.H.J.
Blue Tit	May 1, G.T.P.C.
Cole Tit	9 eggs May 9, A.B.; W.H.W.; G.L.
Long-tailed Tit	Ap. 10, J.H.
Water Wagtail	June 25, J.B.O.
Skylark	egg Ap. 24, J.B.F. egg June 26, S.J.S. and L.N.
Yellow Bunting	2 eggs May 8, F.W.; L.B.
Chaffinch... ...	May 4, E.L.H.; J.B.F.
Mountain Finch	Flocks seen during January
House Sparrow	April 4, E.H.T.
Greenfinch ...	Ap. 14, S.E.V.F.
Common Linnet	May 17, P.L.H.; W.H.D.
Starling	2 eggs Ap.5,E.H.T.
Rook	Mar. 14, E.L.H.; J.B.F.
Jackdaw	Ap. 6, E.H.T.
Magpie	5 eggs Ap. 10, S.E.V.F.
Jay	2 eggs May2,J.H.F.
Green Woodpecker	June 2, J.B.O.
Common Creeper	May 23.
Goatsucker ...	2 eggs June 13, C.H.S.
Common Wren	6 eggs May 6,A.B.; W.H.W.; F.M.
Nuthatch... ...	June 2, J.B.O.
Kingfisher ...	June 15, E.M.
Swallow	seen Mar.9, W.C.A. & Ap. 9, J.B.O.; S.E.V.F. egg May 26, E.M.
Martin	seen Mar. 22, J.M.L.D.&G.E.M.
Sand Martin ...	seen Ap.12,F.J.H.J.
Swift	seen May 1, E.M.
Ring Dove ...	Mar. 13, H.G.P. young Mar. 28.
Barbary Partridge	a nest with 12 eggs was found in the first week in June.

Common Quail	12 eggs June 20, A.B.	Moorhen	2 eggs Ap. 30, G. H.A.
Pewit	2 eggs Mar. 25, J.B.O.; S.E.V.F.	Pin-tail Duck...	shot Jan. 13, at Axford.
Common Snipe	plentiful during the winter	Dabchick... ...	Ap. 5, J.B.O.

BOTANICAL NOTICES.

The very cold December of last year so far affected vegetation, that no plants "hybernated," but all flowers were destroyed by the beginning of the present year, and consequently but few plants were in flower before April.—June also was very cold, and hence not only were the dates of flowering later than usual, but the number of plants in flower by the commencement of the holidays was much less than is ordinarily the case. Our thanks are due to Rev. J. Sowerby, for taking notices during a month at least of the half-year.

Five new species have been added to our list.

Camelina sativa	Field near Marlborough, D. C. W. Lysons.
Thlaspi perfoliatum ...	Savernake, F. E. Thompson, Esq.
Geranium pyrenaicum ...	Wootton Rivers, J. B. Fuller.
Lamium incisum	Pewsey, F. J. H. Jenkinson. Mildenhall, F. E. Thompson, Esq.
Alopecurus fulvus	Near Chiseldon, W. D. Fenning, and H. S. Philpot.

The dates given in the following List, unless mentioned to the contrary, are those of the *first flowering* of the Plants. "By" is added when the plant appears to have been in flower a day or two before being observed. An asterisk (*) indicates that the specimen observed was a cultivated one.

Names of those whose Initials occur in the following list, or who have aided in perfecting the Calendar.

A. A.	A. Armstrong, Esq.
G. C. V. B.	G. C. V. Blake.
C. R. B.	C. R. Brown.
C. R. C.	C. R. Carr, Esq.
M. A. C.	M. A. Chilton.
J. M. L. D.	J. M. L. Davies.
G. W. D. L.	Rev. G. W. De Lisle.
R. E. D.	R. E. Dennett.

C. E. D. ... ... C. E. Down.
R. W. D. ... ... R. W. Doyne.
J. W. D. ... . J. W. Dudding.
R. H. D. ... ... R. H. Dyball.
F. H. E. ... ... F. H. Evans.
F. W. F. ... ... Rev. F. W. Farrar, F.R.S.
W. D. F. ... ... W. D. Fenning.
R. S. C. F.... ... ... R. S. C. Francis.
J. B. F. ... ... J. B. Fuller.
E. G. ... ... E. Gardiner.
J. H. G. ... ... J. H. Garland.
F. W. G. ... ... F. W. Giles.
W. G.... ... ... W. Goodchild.
E. R. G. ... ... E. R. Gunner.
H. M. H. ... ... H. M. Hamilton.
C. W. H. ... ... C. W. Haughton.
E. L. H. ... ... E. L. Hesketh.
P. L. H. ... ... P. L. Hesketh.
H. B. H. ... ... H. B. Horner, Esq.
F. E. H. ... ... F. E. Hulme, Esq., F.L.S.
E. H. ... ... E. Hunter.
F. J. H. J.... ... ... F. J. H. Jenkinson.
J. B. K. ... ... J. B. Kite.
F. P. L. ... ... F. P. Lefroy.
D. C. W. L. ... ... D. C. W. Lysons.
G. C. M. ... ... G. C. Mansel.
E. M. ... ... E. Millais.
J. P. M. ... ... J. P. Morgan.
S. M.... ... ... S. Morse.
L. N. ... ... L. Napier.
G. N. ... ... G. Nares.
J. B. O. ... ... J. B. Oakeley.
C. S. P. ... ... C. S. Peach.
G. H. P. ... ... G. H. Perry.
H. H. P. ... ... H. H. Phear.
H. S. P. ... ... H. S. Philpot.
W. F. R. ... ... W. F. Rogers.
C. S. ... ... C. Sankey, Esq.
A. H. G. S. ... ... A. H. G. Skrine.
T. N. H. S. ... ... T. N. H. Smith.
S. J. S. ... ... S. J. Soady.

J. S. ... ... Rev. J. Sowerby.
J. E. S. ... ... J. E. Square.
F. S. ... ... F. Storr, Esq.
C. W. T. ... ... Rev. C. W. Tayler.
F. E. T. ... ... F. E. Thompson, Esq.
C. E. T. ... ... Rev. C. E. Thorpe.
A. E. T. ... ... A. E. Townsend.
S. F. T. ... ... S. F. Townsend.
J. V. ... ... Mr. J. Velvin.
H. J. V. ... ... H. J. Verrall.
H. J. S. W. ... ... H. J. S. Ward.

RANUNCULACEÆ.

Thalictrum—
flavum ..... June 5.
Anemone—
nemorosa..... Mar. 12, G.N. and G.C.V.B.
*hepatica ..... Feb. 15, G.W.D.L.
Myosurus—
minimus ..... by May 9.
Ranunculus—
Drouetii..... by May 17, F.S.
heterophyllus full May 9.
pseudo-fluitans Mar. 31, F.E.T.; Ap. 14, 25.
peltatus ..... by May 6, J.S.
sceleratus ... full May 17.
Flammula ... May 17.
Ficaria..... Feb. 23, C.E.T.
auricomus ... Mar. 30, F.J.H.J.
acris ..... Ap. 1, 25.
repens ..... Ap. 30, R.W.D. and F.J.H.J.
bulbosus ..... Ap. 8; Ap. 17, J.E.S.
arvensis ..... May 9, F.W.F.
Caltha—
palustris ..... Ap. 1, 25.
Trollius—
*europæus ... about Ap. 20.
Eranthis—
*hyemalis ..... Feb. 10.
Helleborus—
viridis ..... Mar. 8, G.W.D.L.
Aquilegia—
*vulgaris ..... by May 2.

BERBERIDACEÆ.

Berberis—
vulgaris ..... by May 7, J.S.

PAPAVERACEÆ.

Papaver—
Argemone ... May 9, J.S.
Rhœas..... bud May 17; May 26, J.S.
dubium ..... May 26, J.S. & H.J.V.
Lecoqii ..... June 11.
Chelidonium—
majus ..... Ap. 25, J.S. & H.J.V.

FUMARIACEÆ.

Corydalis—
*solida .... Mar. 5, G.W.D.L.
Fumaria—
officinalis ..... Ap. 27, F.J.H.J.

CRUCIFERÆ.

Cheiranthus—
*Cheiri ..... Mar. 24. G.W.D.L.
Nasturtium—
officinale ..... May 26, J.S. and D.C.W.L.
palustre ..... May 13, W.D.F. and H.S.P.
Barbarea—
vulgaris ..... Ap. 17; Ap. 30, F.J.H.J.

Arabis—
hirsuta..... May 2, C.E.T.
Cardamine—
hirsuta..... Mar. 6.
pratensis..... Ap. 1; Ap.8, S.J.S.
Sisymbrium—
officinale..... May 12, F.J.H.J.
thalianum ... Ap. 23, J.S.
Alliaria—
officinalis..... Ap. 14, F.E.T.
Brassica—
campestris ... Ap.20,J.S.& H.J.V.
Rapa ..... Ap. 12, G.W.D.L.
Sinapis—
arvensis ..... May 12.
Aubrietia—
*purpurea..... Feb. 20, C.R.C.
Draba—
*aizoides ..... Mar. 15.
verna ..... Feb. 28, J.S.
Armoracia—
*rusticana..... bud May 13, F.J.H.J.
Lepidium—
campestre ... by May13, F.J.H.J.
Thlaspi—
perfoliatum .. by Mar. 31.
arvense ... .. by May 9.
Camelina—
sativa ..... by May 26, D.C.W.L.
Capsella—
Bursa-pastoris Mar. 16, A.E.T.
Senebiera—
coronopus .. May 12, F.J.H.J.
Raphanus—
Raphanistrum by May 9.

RESEDACEÆ.

Reseda—
lutea ..... May 17, F.E.T.
Luteola ..... bud May 19, J.B.F.

CISTACEÆ.

Helianthemum—
vulgare ..... May 13, F.J.H.J.

VIOLACEÆ.

Viola—
odorata ... .. Mar. 4, F.P.L. and P.L.H.
hirta ..... Mar. 11, J.S.
(a) Reichenbachina ... Mar. 20, S.F.T.
(b) Riviniana Mar. 31, S.F.T.
canina ..... full May 14.
tricolor ..... Ap. 24.
(a) arvensis Mar.24, F.P.L. and F.W.G.

POLYGALACEÆ.

Polygala—
vulgaris ..... Ap. 25, J.S. and H.J.V.

CARYOPHYLLACEÆ.

Silene—
inflata ..... June 11, F.J.H.J.
Lychnis—
Flos-cuculi ... May 26, F.J.H.J.
vespertina ... May 4, J.B.K. and F.P.L.
diurna .... Ap. 30, R.W.D.
Sagina—
procumbens May 26.
Arenaria—
trinervis ..... Ap. 27, G.W.D.L.
serpyllifolia May 5, F.J.H.J.
Stellaria—
media .. .. Feb. 14; Mar. 11.
Holostea ..... Ap. 14, 25.
graminea..... May 19, F.J.H.J.
uliginosa..... May 9.
Cerastium—
glomeratum Ap. 24.
triviale..... Mar. 12, J.S.
*arvense ..... May 7.

MALVACEÆ.

Malva—
- moschata..... not in fl. June 28.
- sylvestris..... June 1, J.S. and H.J.V.
- rotundifolia... June 7.

TILIACEÆ.

Tilia—
- *parvifolia ... young buds June28.

HYPERICACEÆ.

Hypericum—
- *Androsæmum full bud June 28.
- perforatum... June 25, S.J.S.
- hirsutum..... cold. bud June 18, F.J.H.J.

ACERACEÆ.

Acer—
- campestre ... Ap. 30, F.J.H.J.
- *Pseudo-platanus full bud Ap. 30, L.N.; fl. May 6.

ÆSCULACEÆ.

Æsculus—
- *Hippocastanum by Ap. 15; fl. Ap. 26.

GERANIACEÆ.

Geranium—
- Phæum ..... May 7.
- *sylvaticum .. May 14.
- pratense ..... May 26, J.S., J.B.K., &c.
- *sanguineum about June 4.
- dissectum ... May 17.
- columbinum May 19, F.J.H.J.
- rotundifolium May 17.
- molle ..... Ap. 24.
- lucidum ..... Ap. 30, C.E.T.
- robertianum May 3, G.W.D.L.
- *macrorhizon May 13.
- pyrenaicum... by May 12, J.B.F.

Erodium—
- cicutarium ... by May 9, J.S.

LINACEÆ.

Linum—
- catharticum by June11, F.J.H.J.
- *montanum .. May 14.

OXALIDACEÆ.

Oxalis—
- Acetosella ... Mar. 25, F.P.L.

CELASTRACEÆ.

Euonymus—
- europæus..... May 17, M.A.C.

Staphylea—
- *pinnata ..... full May 2.

RHAMNACEÆ.

Rhamnus—
- catharticus... some over June 11. fl. June 18, F.J.H.J.

LEGUMINOSÆ.

Ulex—
- europæus..... byFeb.16,G.W.D.L.

Genista—
- tinctoria ..... by June 25, J.S.

Sarothamnus—
- scoparius..... full May 2, J.S.

Medicago—
- lupulina ..... Ap.20,J.S.&H.J.V.

Trifolium—
- pratense ..... Ap. 29.
- repens ..... May 1, E.L.H.
- procumbens by May 26, J.S.
- minus ..... May 12.
- *incarnatum... May 9, J.S.

Lotus—
- corniculatus May 6.

Anthyllis—
- vulneraria ... May 17, H.H.P.

Vicia—
- hirsuta..... May 12.
- tetrasperma full May 26, J.S.
- Cracca ..... June 8.
- sepium..... Ap.25,J.S.&H.J.V.

sativa .... May 12, J.S.
*faba .... by May 9.
Lathyrus—
pratensis ..... May 26, J.S.
macrorrhizus Ap. 15.
Hippocrepis—
comosa ..... May 19, F.J.H.J.
Onobrychis—
sativa ..... May 17, W.G. and W.D.F.
Cytisus—
*Laburnum ... May 6.
Orobus—
*vernus ... . Mar. 19.

ROSACEÆ.

Prunus—
(a) spinosa ... Ap. 1, S.F.T. & L.N.
(b) institia ... Mar. 30, J.B.F. and E.L.H.
(c) domestica Ap. 24.
Cerasus ..... Ap. 9, G.W.D.L. Ap. 25.
Spiræa—
Ulmaria ..... by June 25, F.J.H.J.
Filipendula... June 25, J.S.
Poterium—
Sanguisorba May 4, R.E.D.
Alchemilla—
vulgaris . .... by Ap. 25, F.J.H.J.
arvensis ..... May 7, J.S.
Potentilla—
anserina ..... May 8, G.W.D.L.
reptans ..... May 26, J.B.K.
Tormentilla May 7, G.C.M.
fragariastrum March 18, J.S.
Fragaria—
vesca ..... Ap. 25, J.S. & H.J.V.
Rubus—
Idæus ..... May 26, J.S.
cæsius ..... May 17.
Geum—
urbanum ... Ap. 25, F.J.H.J.
rivale ..... Ap. 25, G.H.P.
Rosa—
canina ..... May 26, J.B.K.; F.W.G.
tomentosa .. June 11, A.H.G.S.
arvensis ..... June 24, A.H.G.S.
Crataegus—
Oxyacantha May 2, C.E.T.
Pyrus—
Malus ..... Ap. 16, C.S.P.
*aucuparia ... May 12.
*Japonica ... Mar. 16,
apple ..... Ap. 20, J.W.D.
apricot ..... Mar. 9, J.V.

ONAGRACEÆ.

Epilobium—
montanum ... June 16.

CUCURBITACEÆ.

Bryonia—
dioica ..... May 26, J.B.K.

PARONYCHIACEÆ.

Spergula—
arvensis ..... May 9.
Scleranthus—
annuus ..... full May 9.

CRASSULACEÆ.

Sedum—
*Rhodiola ... Ap. 15.
acre ..... June 25, A.H.G.S.

GROSSULARIACEÆ.

Ribes—
*Grossularia March 14.
rubrum ..... Ap. 6, J.S.
*sanguineum Mar. 25.
*aureum ..... Ap. 16, S.J.S. and W.F.R.

SAXIFRAGACEÆ.

Saxifraga—
*crassifolia ... Mar. 15.
*oppositifolia Feb. 26.

tridactylites full bud, Ap. 4, J.S. fl. Ap. 23, J.S.
granulata ... Ap. 24.

Chrysosplenium—
oppositifolium Ap. 25, J.S. & H.J.V.

UMBELLIFERÆ.

Sanicula—
europæa ..... May 4, R.E.D.

Bunium—
flexuosum ... May 7, F.J.H.J.

Pimpinella—
Saxifraga ... May 9, F.J.H.J.

Æthusa—
Cynapium ... May 12, F.J.H.J.

Pastinaca—
Sativa ..... Ap 2, J.B.F. & E.L.H. May 26.

Heracleum—
Sphondylium May 5, F.J.H.J.

Scandix—
Pecten-Veneris Ap. 24, May 6, J.S.

Anthriscus—
sylvestris ... Mar. 30, F.J.H.J., Ap. 25.

Chærophyllum—
temulum..... June 2.

Silans—
pratensis..... June 1, J.S.

ARALIACEÆ.

Adoxa—
Moschatellina Mar. 18, J.S., Mar. 31

CORNACEÆ.

Cornus—
sanguinea ... just out, May 26, E.M., H.H.P.

CAPRIFOLIACEÆ.

Sambucus—
nigra ..... May 26, F.J.H.J.; J.B.K.

Virburnum—
Lantana ..... Ap. 27, J.S., F.J.H.J.
opulus ..... May 26, E.L.H. & E.M.

Lonicera—
Periclymenum May 26, H.M.H.

RUBIACEÆ.

Sherardia—
arvensis ..... May 9, F.J.H.J.

Asperula—
cynanchica... nearly out, May 17.
odorata ..... Ap. 24.

Galium—
cruciatum ... Ap. 29, E.R.G. and R.S.C.F.
Aparine ..... May 6, F.J.H.J.
Mollugo ..... June 21, F.J.H.J.
verum ..... June 21, F.J.H.J.
saxatile ..... June 11, J.S.
palustre ..... about June 20.

VALERIANACEÆ.

Valeriana—
dioica ..... Ap. 25.

Valerianella—
olitoria ..... by Ap. 30.
dentata ..... full May 9, J.S.

DIPSACACEÆ.

Knautia—
arvensis ..... June 8, F.W.G. and J.B.K.

Scabiosa—
Columbaria... June 2.

COMPOSITÆ.

Petasites—
vulgaris ..... Mar. 10.

Tussilago—
farfara ..... Mar. 4, J.B.F. and H.J.V.; C.S.; H.B.H.

Erigeron—
aeris ..... May 6.

Bellis—
perennis ..... Feb. 18, J.B.F.; H.J.V.; E.L.H.

Achillea—
Millefolium... May26,J.S.; H.;&c.
Matricaria—
Parthenium bud June 12, G.W.D.L.
inodora ..... Ap. 6, J.S.
Chrysanthemum—
Leucanthemum May 19, F.J.H.J.
Doronicum—
*Pardalianches May 2.
Senecio—
vulgaris ..... Feb. 18, Mar. 18.
Jacobæa ..... May 17.
sylvaticus ... June 25, J.S.
Centaurea—
nigra ..... June 24, G.W.D.L.
Cyanus ..... June 8.
Scabiosa ..... budMay17,F.J.H.J.
Carduus—
crispus ..... May 17, H.J.V.
palustris ..... May 26,E.L.H.,&c.
acaulis..... June 25, F.J.H.J.
Lapsana—
communis ... June 25.
Hypochœris—
radicata ..... May 9.
Apargia—
hispida ..... May 12, J.S.
Tragopogon—
minor ..... May 28, J.B.K.; F.W.G.; H.H.P.
Leontodon—
Taraxacum... Feb.16,J.S., Mar.5.
Sonchus—
asper ..... May 26.
Crepis—
virens ..... May 26.
Hieracium—
Pilosella ..... May 12.

CAMPANULACEÆ.

Specularia—
hybrida ..... May 28, J.S.&H.J.V.

AQUIFOLIACEÆ.

Ilex—
Aquifolium... May 12.

JASMINACEÆ.

Ligustrum—
*vulgare ..... June 25, F.J.H.J.
Fraxinus—
excelsior ..... Mar. 26, R.H.D. & S. F. T.

APOCYNACEÆ.

Vinca—
minor ..... full Mar. 18, J.S.
major ..... Ap. 2, F.E.T.

GENTIANACEÆ.

Menyanthes—
trifoliata ..... Ap. 27, J.H.G.

POLEMONIACEÆ.

Polemonium—
cæruleum ... bud May 26, E.M.

CONVOLVULACEÆ.

Convolvulus—
arvensis ..... June 7.

BORAGINACEÆ.

Cynoglossum—
officinale ..... May 26, E.L.H.; H.
Borago—
*officinalis..... by June 24.
Lycopsis—
arvensis ..... by May 9, J.S.
Symphytum—
officinale ..... Ap. 23, F.J.H.J.
Echium—
vulgare ..... by June 16, A.A.
Pulmonaria—
*officinalis... .. Mar. 11, G.W.D.L.
Lithospermum—
officinale ..... May 17.
arvense ..... Ap. 6, J.S.
Myosotis—
palustris ..... May 26.

arvensis ..... Ap. 25, J.S. & H.J.V.
collina ..... by Ap. 25, J.S. and H.J.V.
versicolor ... May 6.

SOLANACEÆ.

Solanum—
Dulcamara ... June 18, S.J.S.
Atropa—
*Belladonna ... by June 8.
Lycium—
*barbarum..... by May 9.

OROBANCHACEÆ.

Orobanche—
elatior ..... bud June 25, S.J.S. and L.N.
Lathræa—
squamaria ... by Ap. 2, F.H.E., E.H., & E.G.

SCROPHULARIACEÆ.

Digitalis—
*purpurea..... by June 23.
Linaria—
minor ..... about June 6.
Scrophularia—
nodosa ..... full bud May 17; fl. by June 11, S.J.S.
aquatica ..... about June 20.
*vernalis ..... March 25.
Melampyrum—
pratense ..... May 26, E.L.H., J.B.K., H.M.H., &c.
Pedicularis—
sylvatica ..... May 17.
Rhinanthus—
Crista-galli ... May 17, J.W.D.
Euphrasia—
Odontites..... about June 20.
Veronica—
Anagallis..... May 17.
Beccabunga May 9, F.W.F.
Chamædrys... Ap. 18, C.W.T.
officinalis..... June 12.
serpyllifolia .. Ap.25, J.S. & H.J.V.
arvensis ..... by May 2.
agrestis ..... March 18.
polita ..... Feb. 18.
Buxbaumii ... Mar. 18.
hederifolia ... Feb. 18.

LABIATÆ.

Salvia—
*verbenaca ... May 12.
Thymus—
serpyllum ... June 1.
Prunella—
vulgaris ..... by June 24.
Nepeta—
Glechoma ... March 25, F.W.G. and J.B.K.
Lamium—
amplexicaule Feb. 28, J.S.
purpureum ... Feb. 20, G.W.D.L.
album ..... Mar. 12, S.F.T.; Mar. 31.
*maculatum ... Mar. 27, G.W.D.L.
Galeobdolon Ap.25, J.S.&H.J.V.
incisum ..... full May9, F.J.H.J.
Stachys—
sylvatica ... .. June 1.
Ballota—
fœtida ..... May 12.
Ajuga—
reptans ..... Ap.25, J.S.&H.J.V.

PRIMULACEÆ.

Primula—
vulgaris ..... Feb. 21.
veris..... Mar. 26, S.M.; E.L.H.; P.L.H.
Lysimachia—
Nummularia about June 20.
nemorum ... May 17.

Anagallis—
arvensis ..... June 18, F.J.H.J.

PLANTAGINACEÆ.

Plantago—
lanceolata ... Ap. 22, J.S.
media ..... May 10, F.J.H.J.
major .... not by June 28.

CHENOPODIACEÆ.

Chenopodium—
Bonus Henricus May 17, G.W.D.L.

POLYGONACEÆ.

Rumex—
crispus ..... June 25, S.J.S.
acetosa ..... May 12.
Acetosella ... by May 9.

Polygonum—
Bistorta ..... by May 9.
Amphibium... bud May 26.
aviculare ..... May 17.

THYMELACEÆ.

Daphne—
*Mezereum ... full Mar. 5, J.B.F.
Laureola ..... Feb. 16, G.W.D.L.

EUPHORBIACEÆ.

Buxus—
*sempervirens Mar. 11, J.S.

Euphorbia—
Helioscopia ... Ap. 15.
amygdaloides Ap. 25.

Mercurialis—
perennis ..... Mar. 4, F.P.L. and P.L.H.

CALLITRICHACEÆ.

Callitriche—
verna ..... May 12.

URTICACEÆ.

Urtica—
urens ..... May 8, G.W.D.L.
dioica ..... fl. May 26, E.L.H., &c.

ULMACEÆ.

Ulmus—
suberosa ..... fl. in Mar.
montana ..... Mar. 4.

AMENTIFERÆ.

Salix—
triandra ..... by May 4.
caprea ..... fl. Mar. 7.
rubra ..... by Mar. 21, S.F.T.

Populus—
nigra ..... by Mar. 9, J.S.

Betula—
glutinosa ... over May 12.

Fagus—
sylvatica ..... May 8.

Quercus—
Robur ..... nearly out May 6, fl. May 12.

Corylus—
Avellana ..... Feb. 13.

Juglans—
*regia..... May 17.

Carpinus—
Betulus ..... just out Mar. 24.

CONIFERÆ.

Taxus—
baccata ..... by Mar. 3.

Pinus—
sylvestris ... May 12.

Larix—
*europæa..... Mar. 11, G.W.D.L.

TRILLIACEÆ.

Paris—
*quadrifolia ... nearly out, Ap. 12, F.J.H.J.

DIOSCOREACEÆ.

Tamus—
communis ... May 26, J.S., &c.

ORCHIDACEÆ.

Orchis—
Morio ..... May 1, H.J.V.
mascula ..... Ap. 20, J.S. & H.J.V.
ustulata ..... June 2, J.S.

maculata ... bud May 26.
latifolia ..... May 12, J.B.K.

Habenaria—
chlorantha ... May 17.

Listera—
ovata ..... May 17, J.B.F.

Cephalanthera—
grandiflora ... young bud May 17, F.J.H.J.

IRIDACEÆ.

Iris—
Pseud-acorus May 26, F.J.H.J. and E.L.H.

Crocus—
* ..... Feb 17.

AMARYLLIDACEÆ.

Narcissus—
Pseudo-narcissus ..... Mar. 10, G.W.D.L.

Galanthus—
nivalis ..... Feb. 10.

ASPARAGACEÆ.

Convallaria—
*majalis ..... beginning of May.

Polygonatum—
multiflorum May 4, T.N.H.S.; May 12.

Ruscus—
*aculeatus..... by Feb. 18.

LILIACEÆ.

Fritillaria—
*Meleagris ... by Ap. 15.

Ornithogalum—
*umbellatum May 7.

Scilla—
*Sibirica ..... Feb. 26.

Allium—
*Schœnoprasum May 21.
ursinum ..... May 2.

Endymion—
nutans..... Ap. 14, 24.

JUNACEÆ.

Luzula—
pilosa ..... Mar. 15.
campestris ... Ap. 4, J.S.

TYPHACEÆ.

Sparganium—
ramosum..... May 26.

ARACEÆ.

Arum—
maculatum ... Ap. 20, L.N.

Orontium—
*aquaticum ... May 7,J.H.G.

LEMNACEÆ.

Lemna—
minor ..... May 26, E.L.H.

POTAMOGETONACEÆ.

Potamogeton—
crispus..... June 11, J.S.
densus ..... May 11, F.E.H.

Zannichellia—
palustris ..... by about June 20.

CYPERACEÆ.

Eleocharis—
palustris ..... May 26.

Carex—
divulsa..... by May 6.
vulpina ..... May 9.
paniculata ... May 9.
*pendula ..... nearly out May 7.
præcox..... by May 6, J.S.
disticha ..... May 9.
glauca ..... Ap. 25, F.J.H.J., J.S., & H.J.V.
sylvatica ..... May 17.
hirta..... May 12.
paludosa ..... May 4.
riparia ..... Ap.25, J.S., H.J.V., and F.E.T.

GRAMINEÆ.

Phalaris—
arundinacea June 11.

Anthoxanthum—
odoratum..... Ap.25,J.S.&H.J.V.
Phleum—
pratense ..... June 1.
Alopecurus—
pratensis ... Ap. 8.
geniculatus... May 17, F.J.H J.
agrestis ..... May 9, F.J.H.J.
fulvus ..... May 18, W.D.F. and H.S.P.
Milium—
effusum ..... May 12.
Agrostis—
alba ..... June 17.
Holcus—
lanatus ..... June 18, F.J.H.J.
Trisetum—
flavescens ... June 8.
Avena—
pratensis..... by June 11, F.J.H.J.
pubescens ... May 7, F.J.H.J.
Arrhenatherum—
avenaceum ... about June 20.
Kœleria—
cristata ..... June 18, F.J.H.J.
Melica—
uniflora ..... May 6.
Poa—
annua ..... Mar. 11, J.S.
trivialis ..... May 17.
pratensis..... April 29.
Glyceria—
fluitans ..... June 18, F.J.H.J.
Briza—
media ..... May 19, F.J.H.J.
Cynosurus—
cristatus ..... by June 18, F.J.H.J.
Dactylis—
glomerata ... May 8, G.W.D.L.
Festuca—
ovina ..... May 12.
rubra ..... May 9.
arundinacea by June 8, H.J.V.
Bromus—
erectus ..... May 6.
asper ..... about June 20.
sterilis ..... Ap. 30, F.J.H.J.
Serrafalcus—
mollis ..... Ap. 19.
Triticum—
repens ..... about June 20.
Lolium—
perenne ..... Ap.25, J.S. & H.J.V.
Rye, ear ..... Ap. 24.
Wheat, ear ..... June 18, J.M.L.

EQUISETACEÆ.

Equisetum—
arvense ..... fl. over April 1, 25.
palustre ..... May 12.

FILICES.

Botrychium—
Lunaria ..... May 13, F.J.H.J.
Ophioglossum—
vulgatum ... April 27, F.J.H.J.

ADDITIONAL NEW LOCALITIES.

Veronica Scutellata—in a pond on the down above Huish. Miss C. A. Cumming.
Melilotus officinalis—field by Martinsell. C.E.T.
Senecio sylvaticus—common on the Downs between Huish and Alton. J.S.
Cichorium Intybus—Railway Bank near Granham Farm. J. B. Gilmore, Esq.
Hyoxyamus niger—Waste Ground near Rockley. J.S.

DONATIONS TO THE MUSEUM.

Archæology.—

Assignat (value 500 livres) of the original French Republic, presented by L. Tracey.

Note for 5 cents, by J. B. Kite.

Rio de la Plata note, value 3d. by E. Hunter.

Bazilian Bank note, value 10d. by G. C. Swan.

Two sets of Japanese Coins, by Rev. C. E. Thorpe.

Mexican Coin, by H. M. Bremridge.

Piece of Roman pavement from Castor, near Peterborough, by Rev. J. W. Mills.

Thirteen Celts from St. Acheul and Denmark, by Rev. F. W. Farrar, F.R.S.

Botany.—

Collection of British plants, by J. Britten, Esq., F.L.S.

Four volumes of Austrian Willows
Monograph of the Genus *Cladonia*, by W. Mudd
Leaf of Pitcher Plant *(Nepenthes distillatoria)*
} Rev. F. W. Farrar, F.R.S.

Specimen of *Polygala Austriaca*, by J. F. Duthie, Esq.

Entomology.—

Case of Insects, by Rev. F. W. Farrar, F.R.S.

Box of British Insects, by Rev. J. W. Mills.

Box of Foreign Beetles, by E. L. Hesketh.

Specimen of Eyed Hawk (*S. Ocellatus)* by A. P. Macgregor.

Geology.—

Various fossils, by C. W. Haughton.

Fossil from Shanklin, Isle of Wight, by F. E. Hulme, Esq., F.L.S.

Fossils from the Greensand, near Cambridge, by Rev. G. T. Bonney, F.G.S.

Tooth of Mastodon, by Haileybury College.

Two Ammonites from Whitby, by G. Nares.

Teeth from Rodmarton, by D. C. W. Lysons.

Lead ore and Lava from Vesuvius, by Rev. J. W. Mills.

Case of Minerals, Coprolite, jaw of Ichthyosaurus, Tooth of Elephant, Fossil Fern, Orthoceratite, Pentacrinite, &c.
} Rev. F. W. Farrar, F.R.S.

Library.—

Rev. A. C. Smith's, "Spring Tour in Portugal" by The Author.

E. F. im Thurn's "Birds of Marlborough" by The Author.

Natural History of Insects, by H. C. Spry, Esq.

Swainson's Conchology
Clark's British Seaweeds
Hogg on the Microscope
} by F. E. Hulme, Esq., F.L.S.

Griffin's Chemical Recreations
Common objects of the Country
} by R. W. Doyne.

"Science Gossip" and "Popular Science Review" by Rev. J. M. Fuller.

"The Ibis," "Entomologist," and "Entomologist's Monthly Magazine," by Rev. T. A. Preston.

Journal of the Linnæan Society } by J. Britten, Esq., F.L.S. F. E. Hulme, Esq., F.L.S.

Pamphlets of Transactions of Various Societies, by J. Britten, Esq., F.L.S.

Transactions of the Clifton College Scientific Society, The Society.

Report of the Harrow School Scientific Society, Rev. F. W. Farrar, F.R.S.

Report of the Cheltenham College N.H.S, by the Society.

Report of the Wellington College N.H.S., by the Society.

Report of the Winchester College N.H.S., by the Society.

Report of the Rugby School N.H.S., by the Society.

Ornithology.—

Eggs of Great Bustard, &c., from Spain, by E. S. Preston.

Eggs of Gulls, &c., from Scotland, by H. B. Jeffreys.

Egg of Emu, by D. F. Grant Dalton, Esq.

Eggs of Lesser Whitethroat and Lesser Redpole, by E. Lloyd, Esq.

Eggs of Nightingale, Goatsucker, &c., by Rev. F. W. Farrar, F.R.S.

Zoology.—

Stuffed specimen of Shark, by E. Hunter.

Fine specimen of Coral, by F. E. Hulme, Esq., F.L.S.

Case of Shells and Two Snakes, by Rev. F. W. Farrar, F.R.S.

Miscellaneous.—

Relic from Delhi, by W. C. Adams.

"Kaffi" from Madagascar, by Mrs. Angell.

DONATIONS TO THE FUNDS OF THE SOCIETY.

	£	s.	d.
Rev. Professor Sedgwick, F.R.S.	5	0	0
Mrs. Norris	1	1	0
C. Hodgson, Esq.	1	0	0
Rev. J. S. Thomas	1	1	0
A. Armstrong, Esq.	0	2	6
F. Storr, Esq.	0	2	6
C. R. Carr, Esq.	0	2	6
Small Sums	0	0	6
	£8	10	0

In addition to the above a special subscription is in course of formation towards defraying the expenses connected with the opening of the Botanical Garden. The balance in hand will be entirely devoted to this object, but as the accounts are not yet completed, the details will be deferred till the Christmas Report.

ACCOUNT OF REPORTS.

No. printed	400
Given to Hon. Members	46
Given to Members	15
Given to Donors, &c.	47
Sold	358
In hand	34
	400

ACCOUNTS

Receipts.	£	s.	d.	Expenditure.	£	s.	d.
Balance in hand	17	0	11	Plates for Report, Christmas, 1870	1	18	6
Honorary Members	3	2	6	Subscription to Wilts Archæological Society	0	10	6
Compositions	5	5	0	Microscope	3	4	3
Members	4	16	6	Prize for Essay	1	0	0
Associates	0	7	6	Birds for Museum ...	1	2	11
Arrears	0	18	0	Cupboard	2	0	0
Donations	8	10	0	Hillier's Account	0	14	0
Sale of back Reports	0	6	0	Etceteras	1	3	10
Sale of Reports for Christmas 1870	38	13	6	Printing Account... ...	44	1	0
Sale of "Antiquities" ...	15	7	0	Naming Coins	1	1	0
				Mr. Gregory's fee... ...	4	4	0
				Tablets for fossils... ...	4	12	0
				Balance	28	14	11
	£94	6	11		£94	6	11

W. D. FENNING,
A. C. CHAMPNEYS, } Auditors.

MARLBOROUGH:

C. PERKINS, PRINTER, TIMES OFFICE,

MDCCCLXXI.

REPORT

OF THE

MARLBOROUGH COLLEGE

Natural History Society,

FOR THE

HALF-YEAR,

ENDING CHRISTMAS, 1871.

"Tum mihi Naturæ libeat perdiscere mores:
Quis Deus hanc mundi temperet arte domum."

MARLBOROUGH:
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1872.

B.12.88

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LIST OF MEMBERS.

President:
Rev. T. A. Preston.

Secretary:
A. C. Champneys.

Librarian:
C. E. Vaughan.

Committee:

The Ex-officio Members
A. Babington, Esq.
C. E. Vaughan
H. J. Verrall

Honorary Members:

Rev. G. G. Bradley
Rev. F. W. Farrar, F.R.S.
A. Armstrong, Esq.
H. M. Moule, Esq.
F. E. Thompson, Esq.
W. E. Mullins, Esq.
C. M. Bull, Esq.
Rev. J. F. Bright
Rev. J. Sowerby
Rev. H. Bell
Rev. C. W. Tayler
A. Babington, Esq.
W. Fergus, Esq., M.D.
E. J. Turner, Esq.
S. B. Dixon, Esq., F.G.S.
F. Storr, Esq.
W. H. Macdonald, Esq.
J. F. Duthie, Esq.

G. H. Dawson, Esq.
Rev. W. C. Almack
E. F. im Thurn, Esq.
G. K. Mills, Esq.
R. W. Taylor, Esq.
W. Mansell, Esq.
Rev. G. W. De Lisle
H. A. Evans, Esq.
Rev. J. W. Mills
E. C. Sewell, Esq.
J. Walker, Esq., M.D.
A. C. Hilton, Esq.
F. Giles, Esq.
D. E. Leighton, Esq.
W. W. Fowler, Esq.
M. H. Smith, Esq.
J. F. Cornish, Esq.

C. Sankey, Esq.
A. H. Beesly, Esq.
F. E. Hulme, Esq., F.L.S.
Capt. H. O. Bateman
Rev. C. E. Thorpe
Rev. J. S. Thomas
C. A. Sladen, Esq.
G. E. Manisty, Esq.
W. Koch, Esq.
W. P. Sellick, Esq.
H. C. Spry, Esq.
W. D. Smith, Esq.
G. F. Rodwell, Esq., F.C.S. F.R.A.S.
W. D. Fenning, Esq.
F. S. Austin, Esq.
R. E. Price, Esq.

Members:

J. B. Oakeley
H. S. Sankey
H. J. Verrall
J. H. R. Clark
G. C. Mansel
A. C. Champneys
E. Meyrick
G. H. Perry
R. W. Doyne
C. E. Vaughan
J. P. Morgan
A. J. Spencer
M. A. Chilton
E. Millais
F. W. Toms
F. W. Giles
J. B. Kite
A. P. Macgregor
A. H. G. Skrine
J. W. Dudding
J. E. Pierson
H. H. Phear
E. Hunter
W. D. Steel
J. Simpkinson
N. Whiting
H. W. Thatcher
F. J. H. Jenkinson

Associates:

H. W. Simpkinson
R. St. J. Boddington
H. M. Hamilton
H. Tennyson

PREFACE.

BEFORE alluding to the present Report and the events of the past Half-year, the Committee beg to apologise for two omissions in the last Report. No notice was taken of a paper on "A Visit to Cornwall," read before the Society by E. L. HESKETH, at one of the earlier meetings of the half-year;—nor of a Lecture delivered by J. H. FREEMAN, Esq., F.C.S., on "Spectrum Analysis," illustrated by numerous experiments and diagrams. This lecture, though given principally in behalf of the Society, was open to all members of the School who felt interest enough in the subject to attend. The Lecturer, by the great clearness of his explanations, the beauty of his diagrams, and his successful experiments, deservedly earned the heartiest thanks of all who attended, and there was a universally expressed wish that Mr. FREEMAN would again visit Marlborough, and repeat his lecture, at some future time.

Turning now to the events of the past half-year, the Committee regret to say that the harmony and unanimity of the Society was seriously disturbed by a certain number of the older members, who chose to disapprove of the acts of the Committee. This clique, which at one time really threatened the disruption of the Society, was fortunately destroyed by the prompt action of the Committee, and by the resignation of no less than ten members. Such a loss would have been a severe blow to the Society had these members seceded from any other motive, or had the scientific attainments of the seceders, with one exception, and the general utility of their work, while members of the Society, been conducive to the welfare of that

body, but the Committee must congratulate the Society on such a change of affairs, and they venture to hope that, now that all internal dissensions are settled, the course of the Society's career will be as successful as formerly.

During the course of the half-year a Field-day and Conversazione have been held. On the former a large number of members went to Chisledon, and notwithstanding a few showers, all thoroughly enjoyed themselves and a very fair amount of real work was done. The Conversazione was but poorly attended, though objects of interest were quite as numerous as on former occasions. Through the liberality of the Master, the expenses of the Conversazione were not very burdensome to the funds of the Society.

The Botanical Garden has progressed satisfactorily. The beds were edged with patent tiles at the end of last half-year, and during the holidays the paths were covered with asphalt, thus rendering them firm and dry at all times. The whole of the plants have been re-arranged and the collection has been considerably increased by donations and the personal exertions of members. The Committee beg to return their sincere thanks for two large hampers of plants, sent from the Cambridge Botanical Garden, and by Mrs. L. Burd, of Shrewsbury, respectively. It is intended to have as perfect a collection as possible of Marlborough plants, and also one representative at least of all the British genera or important sections of genera.

Though but few papers are printed in the present Report, yet the Committee must congratulate the Society upon the number of papers read at the meetings (which were latterly held weekly), especially by members of the Society; the list of notices and the table of Botanical records rendering it undesirable to increase the Report to an undue size by printing more of the papers, especially as no new or original observations occur in them. This latter remark is, however, by no means intended to cast any reflection on those papers. It is an almost utter impossibility to get any original matter from beginners, and it would be unreasonable to expect any, but the Committee deemed it more for the interests of the Society to print the tabular arrangement of the botanical notices of the past seven years, than to insert more

of the papers read at meetings, interesting though they may be. The beautiful map illustrating Mr. Babington's paper has been kindly drawn by F. E. Hulme, Esq., F.L.S., and the Committee take this opportunity of publicly thanking him for the unfailing interest which he has always taken in the Society and which has been practically shown by every means in his power.

The Museum and Collections have not been very materially increased, though several donations have been made to the Society. Among them may be more especially noted a very splendid set of Danish Celts, by W. Fergus, Esq., M.D.; an extensive series of flints, and a large collection of fossil bones and teeth, by the Rev. J. F. Bright; a beautiful case of preserved Caterpillars, by Rev. F. W. Farrar, F.R.S.; several rare birds by E. F. im Thurn, Esq.; a stuffed Shark by E. Hunter; a large box of various curiosities, by J. H. Beasley, Esq. For these and all other donations, a detailed list of which will be found elsewhere, the Committee beg to tender their best thanks, and in coming nearly to the end of the eighth year of the existence of the Society—one fraught with much encouragement as well as much danger—they can confidently look forward to a time of greater usefulness as well as of more solid work.

RULES.

1.—That this Society be called the Marlborough College Natural History Society.

Constitution.

2.—That the Society consist of Members, Honorary Members, and Associates.

Officers.

3.—That the Officers of the Society consist of a President, Secretary, Librarian, Curator, and Sub-Treasurer, to be elected from and by Members of the Society.

Election of Officers.

4.—That those Members of the Committee, who are not ex-officio Members, be elected half-yearly, and that the retiring Members be eligible for re-election.

5.—That the same rule apply to the Librarian and Sub-Treasurer.

6.—That each candidate for election give in his name to the President, any time before the day of election.

7.—That all canvassing for votes by a Candidate, or by his friends with his knowledge, shall at once disqualify him for any election that half-year.

8.—That any member canvassing for votes for a Candidate, or for a new rule, forfeit the right to vote on any occasion during that half-year.

9.—That the election of officers of the Society take place near the end of the Half-year, but that they do not come into office till the beginning of the next Half-year.

10.—That on the occurrence of any election, each Member of the Committee have double the number of votes of any other Member of the Society.

11.—That in the event of a vacancy occurring in the Committee or any other office to which members are elected at the beginning of each Half-year, the vacancy be filled up by the Committee.

12.—That eight Honorary Members have the power of debarring a candidate from standing for any office.

Management.

13.—That the affairs of the Society be conducted by a Committee, consisting of the President, Secretary, and three other Members of the Society, to be elected from and by Members of the Society; three of whom shall form a Quorum.

President.

14.—That in case of an equality of votes, the President shall have a double or casting vote.

15.—That in the absence of the President, the Committee be empowered to request any Member of the Society to take the chair.

Secretary.

16.—That the duties of the Secretary be to keep a list of all the members of the Society, and of all former Members and Benefactors who may wish to receive the Reports of the Society; to summon meetings (when necessary) of the Society; to keep a detailed report of the proceedings, as well as lists of Members and Visitors present at each meeting, and generally to act under the direction of the Committee in all matters connected with the welfare of the Society.

17.—That in the absence of the Secretary from any meeting of the Society, minutes of the proceedings be taken by a member of the Committee, appointed by the President.

Librarian.

18.—That the duties of the Librarian be to keep a catalogue of the Library, with the name of the Donors and to see that the Library Regulations are carried into effect.

Curator.

19.—That the Curator be responsible for the order of the Museum and when necessary assist the Secretary in the distribution of the Reports of the Society.

Sub-Treasurer.

20.—That the duties of the Sub-Treasurer be to collect all sums of money due to the Society, under the direction of the Committee.

21.—That the accounts of the Society be managed by the Committee and be audited at least once a Half-year by a competent person, who is not a member of the Society.

Library.

22.—That any Member of the Society be at liberty to consult any of the books belonging to the Society, but that only certain volumes, to be decided on by the committee, be allowed to be taken from the room.

23.—That if any Member wishes to take a volume from the Museum, he shall give his name, and the name of the book, to the Librarian, who shall enter them in the book kept for the purpose.

24.—That every volume so taken out be returned by the end of the quarter, but that no book be kept more than one month.

25.—That if any volume be damaged, such damage shall be reported by the Librarian to the Committee, who shall decide upon any further proceeding in the matter.

Museum.

26.—That any Member of a section, who is not a member of the Society, be allowed access to the Museum at such times as it is open to Members of the Society generally, provided he first obtain leave from the President, which leave shall be renewed every quarter, but may be taken away at any time, if the privileges be abused in any manner.

27.—That the same privileges be extended, under the same conditions, to such other Members of the School who may wish to use the Library and Collections for the purpose of study, provided there be a reasonable excuse for their not belonging to a section.

28.—That in all cases the Museum be used for the study of Natural History alone, and not as an ordinary Reading Room, except on Sundays.

Botanical Garden.

29.—That the Garden be under complete control of the President, or of some person appointed by the President.

30.—That the Garden be open to Members of the Society, at all times, except on Sundays, but not to Visitors.

31.—That any Member on application to the President can have the charge of a bed.

32.—That no plants be put in without special leave from the President.

33.—That Members may keep any plants of their own in such places as the President shall appoint, as long as the ground is not required.

34.—That the Society's flowers may not be picked.

35.—That Members may gather from their own plants, but may not depute others to do so.

Members.

36.—That the election of new Members rest entirely with the Committee.

37.—That every Member pay a half-yearly subscription of 2s. 6d., to be paid at the first meeting of the Society in that half-year.

38.—That if a Member be elected at, or after the Quarter, he shall only pay 1s. on Election.

39.—That Members have the right to be present, to state their opinions, and to vote at all general meetings of the Society; to introduce a visitor at all general meetings of the Society; to have personal access to the Museum at

all times; and to introduce a visitor at such times, as shall seem fit to the Committee.

Honorary Members.

40.—That Honorary Members have all the privileges of Members, except the power of introducing a member of the School to the meetings of the Society.

41.—That Honorary Members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

42.—That Honorary Members may compound for all future subscriptions by the payment of a sum of two guineas.

Associates.

43.—That Associates be confined to members of the VIth and Upper Vth Forms; that they pay 1s. 6d. a half-year, and be entitled to the use of the Museum, and to attend the meetings of the Society whenever they think fit, but shall not be entitled to vote on any question, to introduce a visitor, or to take books out of the Museum.

Visitors.

44.—That on such occasions when the number of those who wish to be present as visitors at the general meetings of the Society is greater than the number of Members who attend, the President and Committee shall be empowered to admit two or more each, as shall seem fit.

Suspension of Members.

45.—That any Member be liable to be excluded from the Society by the Committee, if, in their opinion, he shall have failed to show sufficient energy in the working of the Society.

Sections.

46.—That sections be formed for the more accurate study of the different branches of Natural History, and that the heads of these sections be chosen by the Committee half-yearly from Members of the Society.

47.—That these sections shall hold meetings as often as shall seem fit to the Heads of the several sections, at which any Members of the school, with the sanction of the Head of that section, may attend.

Meetings.

48.—That ordinary meetings of the Society be held once a fortnight, but that the Secretary be empowered to call extraordinary meetings when necessary.

New Rules.

49.—That any Member of the Society have power to propose any new rule or any alteration in an old one, provided the motion be seconded by another Member.

MEETING HELD SEPTEMBER 1st, 1871.

Mr. Babington, C. E. Vaughan, and E. Meyrick, were elected on the Committee, C. E. Vaughan as Librarian, E. Meyrick as Treasurer, and W. C. Adams as Curator.

The following Donations were announced, and thanks ordered to be given to the Donors :—

Proceedings of the New Zealand Institute, by that Society. Explorations of a Cave at Settle, in Yorkshire, by J. E. Pierson. Transactions of the Norwich Naturalists' Society, by H. C. Spry, Esq. Waterton's Essays, by H. A. Evans, Esq.

A fine specimen of a Shark, stuffed, by E. Hunter. Pieces of Pavement from the Alhambra, and fossils, by H. O. Yeatman. Portion of the boot of a man killed by lightning, near Whitby, by G. Nares.

Two specimens of Gibraltar Rock, by E. A. Ogle.

A Sea Porcupine (*Tetraodon reticularis*), by Sergeant Adams.

There were also exhibited a specimen of a Flounder, and *Polypterus Leachii*, a fish from the Nile, and a white variety of the common heather (*Calluna vulgaris*), found by F. E. Hulme, Esq., F.L.S.

The President then read a paper on the Common Nettle and its allies.

The proposition that the office of Librarian should be divided into those of "Librarian" and "Curator," was then passed *nem. con.*

There were 41 persons present, 2 Hon. Members, 30 Members, and 9 Visitors.

MEETING HELD SEPTEMBER 12th, 1871.

This was a private meeting to discuss the advisability of having a Conversazione this half-year. After some little discussion it was almost unanimously agreed to hold one on the 29th September.

There were 20 persons present, 1 Hon. Member, and 19 Members.

MEETING HELD SEPTEMBER 22nd, 1871.

The minutes of the previous meeting were read and confirmed.

The President announced that the Committee, though anxious that every Member of the Society should belong to a Section, yet strongly disapproved of the same person belonging to two different Sections. The Heads of Sections would be very glad to see anyone at the Sectional meetings, but only those who really worked could be considered as belonging to the Section, and thereby entitled to share in the distribution of duplicates, and to join any Sectional "Field Days."

The Committee had decided that when a Member undertook the charge of a bed in the garden, he should be responsible for its tidiness during the whole of the half-year. If the bed were untidy at any time, it would be put tidy by a gardener, and the Member fined to pay expenses.

There would be no supper in Hall after the Conversazione on the 29th, but an extra Field Day would be held if approved of and weather suited.

Archæology.

A. C. Champneys exhibited a piece of one of the Irish Round Towers, presented by H. R. Armstrong; and the President a nodule of Iron Pyrites, found with several other nodules, and some old weapons and armour, whilst digging the foundations of a house on the downs. The people imagined it to be one of Oliver Cromwell's grape shot.

Geology.

H. J. Verrall exhibited some fossils, collected at Chisledon on the Field Day; two specimens of *Pholas* from Whitby, presented by Rev. G. W. De Lisle; and some specimens of Basalt and Sandstone, a Crustacean, and some Organ Coral, on the part of W. C. Adams. He was sorry to announce that no Member had joined his section this half-year.

Ornithology.

J. B. Fuller made the same complaint.

Entomology.

E. Meyrick passed round a very long list of Notices, obtained since the beginning of the holidays, among which were over 20 species new to the College list. He also exhibited a case of Preserved Larvæ, presented by Rev. F. W. Farrar, F.R.S.

There were also exhibited some coins from the Temple of Minerva, at Syracuse, by A. J. Spencer. A medal of the Duke of Wellington, by S. G. Smith; and an Indian play bill and paintings on rice paper, presented by H. C. Spry, Esq.

Library.

C. E. Vaughan announced the donation of the "Dictionary of Science," by the Compiler, G. F. Rodwell, Esq., F.C.S., &c. Eight books on Natural History, by H. C. Spry, Esq.; and that Wallace's "Natural Section" had been purchased by the Society.

A. C. Champneys then read a paper on Barrows and Primitive Interment.

There were 40 persons present, 3 Hon. Members, 26 Members, 2 Associates, and 9 Visitors.

CONVERSAZIONE HELD SEPTEMBER 29TH, 1871.

After a Lecture given to the whole School, by Professor Pepper, the Society held a Conversazione in the Adderley Library. The invitations being confined to Masters and their Friends, the crush experienced on former occasions was entirely avoided. A series of microscopes from Ross, with the usual arrangements of the room on these occasions, afforded sufficient amusement for the time the Conversazione lasted.

The Rev. F. W. Farrar, F.R.S., kindly lent collections of ferns, grasses, &c.; F. E. Hulme, Esq., F.L.S., a large number of diagrams and drawings; Mr. J. B. Gregory a fine collection of minerals; W. Fergus, Esq., M.D., a Russian Obross and some casts in carbonate of lime, besides making up an analysis of R. W. Doyne, which was a source of great interest; G. F. Rodwell, Esq., F.C.S. and F.R.A.S., a triptych of the "Adoration of the Immaculate Lamb;" W. Mansell, Esq., some photographs and statuettes by Thorwaldsen; Mrs. Lye a couple of Chinese paintings from the Summer Palace; and Sergt. Haggis an old work on "Captain Cook's Voyages."

Only about 28 Members and Associates were present.

MEETING HELD OCTOBER 6TH, 1871.

The minutes of the preceding meeting were read and confirmed.

E. Meyrick exhibited a specimen of the Chalk-hill Blue Butterfly (*P. Corydon*), showing the colours of the male on the upper side, and of the female on the under, presented by C. A. Sladen, Esq.

H. J. Verrall exhibited a small paddle of Ichthyosaurus from Lyme Regis on behalf of H. C. Bond.

The President exhibited specimens of Orchella-weed, a lichen from which a purple dye is extracted; Myrobalans, used for tanning and dyeing; and Cotton-pods, presented by J. H. Beazley, Esq.; also balls of Confervæ felted together by water, from a lake in Shropshire.

H. J. Verrall exhibited some ship's timber destroyed by a Teredo, and A. C. Champneys the air-bladder of a fish, also presented by J. H. Beazley, Esq.

F. E. Hulme, Esq., then read a paper on

THE BIOGRAPHY OF A HALFPENNY.

The object of our present remarks is a thing so familiar to us all, that I almost feel that I ought to apologise for trespassing on your time with a matter so trivial, did I not remember that it not unfrequently happens that in our search for objects of interest of any kind, we often pass over that which lies close at hand, while recalling this fact to your minds and to my own, I feel emboldened to hope that I may throw some new light and share of interest therefore on even the plebeian halfpenny. Here, on the threshold of our subject, let me beg it to be understood that the term halfpenny throughout our paper includes, unless express mention is made to the contrary, the penny and the humble farthing, in fact our copper coinage. I am here at once obliged to correct myself, for though we ordinarily speak of it as copper, the term is scarcely admissible, for the metal of which it is made is not copper in its pure state, but what is termed an alloy. An alloy is the admixture of two or more metals for any purpose, thus gold is in itself too soft to stand the wear to which it would be exposed if coined, and the sovereigns would very soon lose weight and be depreciated in value; copper therefore is added in the proportion of 1 to 12 to give the requisite hardness. The ordinary alloy for what is known as jeweller's gold is about 23 parts copper to 77 of gold, the pale gold sometimes used being an alloy of 5 parts of silver to 95 of gold. The term alloy is itself interesting, as it bears evident reference to the necessity for the due proportions of the various metals being observed, to prevent the debasement of the coinage that would otherwise ensue. It is derived from the French *a la loi*, according to the law. The standard gold coin of France and America has 1 part of copper to 9 of gold, a rather larger proportion of copper than we admit in the British coinage. Though somewhat foreign to our subject, we may just remark that the ductility of gold may be completely destroyed by combining with it the 1,920th part of its weight of antimony, though pure gold is itself so ductile that a single grain of it can be drawn out into 500ft. of

wire, while the same minute portion of bismuth renders the alloy produced extremely brittle—though gold unalloyed is so malleable that it may be beaten into sheets so exquisitely fine that it would take 200,000 of them to make a pile one inch high. Silver we may mention may be beaten into sheets of which 100,000 will be needed to the inch, while tin may be so reduced that the sheets shall be the 1000th part of an inch thick.

The alloy from which our pence are made is what is termed bronze, and results from a combination of copper, tin, and zinc in the proportion of 95 parts of copper to 4 of tin and 1 of zinc. Gold, silver, and copper in various states of alloy are now the recognized materials for the money of civilized nations, though many other substances have from time to time been used. The Carthaginians, Spartans, and Romans all in one period of their history used leathern money. Brass, wood, and platinum also have all been employed at divers times. We may here also briefly refer to the so-called Kimmeridge coal money, for though from its fragile nature and its exceedingly local character, being met with only in the neighbourhoods of Kimmeridge and Purbeck in Dorsetshire, it can hardly have been used as money, antiquarians are puzzled to give any other and more probable explanation of its use. The Kimmeridge cliffs are of a bituminous shale, of a dark colour and a laminated texture resembling slate, and it is of this that the so-called money is made. The money is ordinarily found in urns and pateræ; this pottery is of two kinds, a coarse black ware, and a highly finished red pottery, very tastefully ornamented and of very excellent workmanship. The money is circular, varying in diameter from one to three inches, and in thickness from a quarter to half an inch. One side has in the centre a hole by which they were evidently fixed to a lathe, while the other side has various geometrical figures, equilateral triangles, circles, &c., or patterns made by circular holes passing about half way through the substance. Several specimens may be seen in our Museum, while in the catalogue of our archæological collection we have gone into greater length on this interesting subject than is here necessary.

Resuming our consideration more particularly, however, of the halfpenny I have chosen as the subject of our paper, it will be well perhaps to say a few words on the three metals, copper, tin, and zinc, of which we have seen that it is composed.

Copper, by far the most important component, has been known from the earliest ages of which we have any record. Its name is derived from Cyprus, in which island there are copper mines of very great antiquity. It was long used by the Greeks and other nations, prior to the discovery of iron, for domestic vessels, weapons, &c., its tenacity, only second to that of iron, rendering it well adapted for these purposes: you will remember that archæologists speak of various periods as the stone period, the bronze period, and that of iron,

while cynics have not been wanting who have affirmed that this is the age of brass. In England copper is chiefly met with in Cornwall, about two-thirds of the entire home supply being derived from that county, and possessing a money value of almost a million sterling per annum. The value and the amount of the ore in any particular mine fluctuate a good deal, sometimes causing heavy loss on the outlay for months together, at other times richly rewarding the enterprise of the owners. The Huel Virgin mine, in the first fortnight it was worked, produced copper which sold for £5,700, and in the next three weeks £9,600 more, the cost of working the mine for that time being barely £300. Very little of the ore is smelted on the spot, almost all being taken to South Wales, the facilities for navigation and the abundant supply of coal enabling the work to be more profitably carried on in that district. The melting point for copper is 1966° of Fahrenheit's scale. Abroad, Chili, Cuba, the United States, Canada, and Australia are the leading sources of supply. Australian copper ore frequently contains 30 per cent. of metal, the average yield of English ore being only 7 per cent. The mines of the Burra Burra in Australia have in fourteen years produced 26,000 tons of pure copper, of the total value of £3,000,000, the export in 1866, the last year I have been able to find a record of, being 129,272 cwt., with a money value of £584,500, and the copper imported into England from Canada (chiefly from the banks of the Huron) for the same year having a value of £68,600. Copper is of course used very largely commercially and chemically, the supply required for coinage, large as it is, being but a very small item in the general account. The sub-oxide is used in glass staining, it gives a rich ruby red, while the prot-oxide gives a beautiful green stain. Sulphate of copper is very extensively used in calico printing. Arsenite of copper is the base of numerous green pigments; these are often used in wall papers to the great discomfort of the occupant of the room, who, subject to dizziness, bad headaches, &c., doctors himself in vain until some chemical friend denounces in no measured terms the new wall paper, and insists on its being removed. These arsenical greens are sometimes used in confectionery. Medicinally copper requires to be treated with great caution, and in domestic affairs continual care should be exercised that verdegris, the di-acetate of copper, should not be allowed to form on any of the utensils, as it is very poisonous and even a small quantity may prove fatal. Metallic copper, if pure, is not itself possessed of any strong action on the system, but when oxidised or combined with acids it may become a powerful and dangerous poison, and even the use of copper chimnies and reflectors to gas burners in work rooms has been found injurious to health.

Tin, the second of the three metals which go to compose our halfpenny, is one of the most anciently known of any of the metals; Moses, Isaiah, and Ezekiel all mention it. The Egyptians in the time of the Pharaohs used it,

procuring it from the East. The Greeks and Romans obtained it from the Phœnicians, who themselves procured it secretly from Britain. It is abundant in Cornwall, and it is known that the Carthaginians, a Phœnician colony, made regular voyages, about B.C. 460, to the Scilly Isles for supplies of it in exchange for pottery, salt, and brass ware, the mines of Cornwall having been worked uninterruptedly from the earliest times of which we have any record to the present day. A temperature of 442° Fahrenheit is sufficient to fuse it. Tin enters largely into the composition of many valuable alloys, thus pewter is made by the admixture of 4 parts of tin to 1 of lead, bell-metal results from the fusing together of 78 parts of copper with 22 of tin, while what is known as speculum metal, used for the mirrors of reflecting telescopes, is made by mixing 1 part of tin with 2 parts of copper. Tin is by no means so commonly met with as copper, the chief sources from whence our supplies are drawn being Mexico, Australia, and Cornwall. Tin is in the mystical writings of the old alchemists termed Jupiter, copper being referred to as Venus. Tin is but little affected by exposure to the air, as moisture does not affect it: you all remember how speedily a bar of iron will become covered with a red rust if left out in the damp. This property of chemically resisting damp is a very valuable one, as it allows of that safe and extensive use of it with which we are all so familiar for domestic utensils. Tin is in itself not sufficiently strong to be made into articles of any size, but by coating iron or copper vessels with it internally the required strength is gained. Fatal consequences have not unfrequently ensued from allowing liquids, particularly if at all acid in character, to stand for any time in copper vessels before use. Various chemical preparations of tin possess value commercially and in the arts, thus stannate of soda and protochloride of tin are largely used in printing the colours on calico. Bin-oxide of tin added to glass during the making renders it only semi-transparent, and gives in addition a beautiful opalescent lustre to it. Average tin ore yields on smelting from 60 to 65 per cent. of metal. The average yield of tin from the Cornish mines is about 7000 tons annually, the price fluctuates a good deal, but the tin ore as raised from the mine is worth from £70 to £80 per ton, and the metallic tin when smelted and purified so as to be fit for trade purposes will be worth from £100 to £150 a ton. If you have been able to follow me at all in these figures (statistics I know are dreadfully dull things), you will have gained some slight idea of the mineral wealth of this little corner of England.

We pass on now to zinc, the third ingredient in our bronze. Zinc, unlike the two previous metals, is never met with naturally in a state at all approaching the metallic condition in which we find it in commerce, but is extracted from two ores, the sulphide of zinc or blende, and the carbonate of zinc or calamine. It is but little affected by atmospheric influences, and the

small superficial film of oxide which gradually forms upon it when in exposed situations, does not eat into the metal as in the case of iron, but has a preservative effect, protecting the remaining portion from any further change. The melting point of zinc is 773° Fahr. The chief use of zinc in the arts is to form brass, the alloy resulting from the admixture of zinc and copper. The Chinese white, as it is termed, used by painters in water colours, is an oxide of zinc, and the galvanised iron now so freely used is iron coated with a thin protective film of zinc. North Wales and the Isle of Man are the chief sources from whence the home supply is derived, though it is also largely brought from Cornwall, the entire home supply averaging about 10,000 tons annually, with a money value of between £40,000 and £80,000. In addition to this, from 20,000 to 30,000 tons are annually imported from abroad, Germany and the United States being the chief sources from whence the supply is drawn. The oxide, chloride, carbonate, sulphate, citrate, and acetate of zinc are all used chemically and medicinally.

Having now briefly considered the three metals which combined form the materials of our half-penny, we will pass from the raw material to the manufactured article, for as my ambitious paper embraces not only the mineralogical, commercial and chemical, but also the numismatic and archæological views of the subject, we can give but scant time to each, and can only briefly touch on many points which well deserve a greater degree of amplification than we are now able to afford them. As you probably have but a dim idea of the quantity of money annually made, some few statistics may not be without interest. Those for 1867 I found most conveniently obtainable and it is those therefore that I now quote, and if our halfpenny will pardon our including other money in our statement it will perhaps make it the more interesting. The figures I may mention are from a return made to Parliament so that no doubt we can rely fully on their accuracy. It states that no half-crowns have been made at the mint since 1851, if therefore you get one dated 1870 you will be justified in regarding it with decided suspicion. No fourpenny pieces have been made for 11 years, and in 1867 no sovereigns were coined. 992,795 half-sovereigns were however struck off. 423,720 florins, 2,166,120 shillings, 1,362,240 sixpences, 717,288 threepences,—of the bronze coinage 5,483,520 pence were made, representing a money value of £22,848. 2,508,800 half-pence or £5,226 worth, and the same value of farthings, the number of coins requisite being 5,017,600.

The machinery at the Mint is singularly beautiful and perfect in its operations, permission to see it can however only be obtained by a special order from the Master. The early attempts at coining were frequently of a very rude description, the die, generally circular, being struck in the centre of a mass of metal which was only a mere approximation to a circle, and only one side of the coin was stamped with a device.

The silver coinage of Egina is the earliest known, and dates from about B.C. 895. The first coinage used by the Romans was copper and dates about 500 B.C. silver coins being introduced in the year 266 B.C. and gold, 204 B.C. Returning however to our halfpenny we will confine our attention at present to its British ancestors. During the Roman period all money was required to bear the Imperial stamp and was of a far higher order of excellence than that which immediately followed it.* The earliest Saxon coin extant is of the reign of Ethelbert I, whose reign you will remember commenced in the year 561 of our era. The penny (*penige*) is first mentioned by name in the laws of Ina A.D. 688.

The meaning of the word penny has given rise to considerable discussion, some antiquarians concluding that the true derivation is from the Latin *pendo* to weigh, the coins like the old ounce pennies being used not only as expressions of value but also as weights. This though possible is hardly I think probable, a West Saxon word would hardly have a Latin base, and the derivation from the Anglo-Saxon *pening*, cattle, the rather commends itself to us and more especially when we remember that the Saxons were a pastoral people, and that cattle would thus represent to them the best means of barter prior to using money, and we are the more emboldened to think that this possibly may be the true meaning when we recall the same association of ideas in our English word pecuniary, derived I need scarcely say from the Latin *pecus*, cattle, cattle being originally the wealth of the Romans, so that the man who was best off pecuniarily was the man who owned the largest herd. Should neither of these derivations however satisfy your critical judgment I can offer you a third, from the Old Breton word *Gwenneck*, a diminutive of *gwen*, white, the early pennies being made of silver. The word halfpenny (half *penige*) occurs in the Saxon gospels.

A tolerably complete collection of the coins of the Saxon times has come down to us, those of Mercia being especially numerous. The reverse of the coin almost always has the name of the moneyer upon it, and this custom remained in force till the reign of Edward I. Henry I. was the first king who had halfpence and farthings coined, up till that time the halfpenny was literally half a penny, and the farthing a fourthing of it, the penny being halved or quartered to represent the lower values. It would be interesting did time permit to trace the penny downwards to the present time and to point out its various modifications, we can now however only mention a few

* You will remember the incident in Palestine, bearing on the tribute money, Palestine at the time of our Lord's earthly life being a province under the Roman sway. "Shew me the tribute money. And they brought unto him a penny. And He saith unto them, 'Whose is this image and superscription?' They say unto him Cæsar's."

things respecting it. Those of Stephen are very bad, the continual state of turmoil in which he lived being no doubt the reason. Of Richard the I's reign, and that of John, we have no English money preserved, though pence, halfpence, and farthings of John are all extant, in every case however yet known Dublin was the place where they were made. The last silver farthing was struck in the reign of Edward VI, the last silver halfpenny during the protectorate of Oliver Cromwell. During several of the reigns the archbishops had the privilege of moneying, and one of the charges brought against the arrogant Wolsey was that he presumed to stamp the king's money with the cardinal's hat.

The first issue of copper halfpence and farthings was in 1672, silver having previously been employed. James II substituted tin for the copper, but speedily reverted to the copper again. In the reign of George III copper coins of the value of 2d. were introduced; they were soon however found to be too unwieldy for practical use, and but few of them were made. In 1852, a period within the recollection of many of us, half-farthings were issued, but these are never seen, at least in England, their use being to supply the demand in the colonies for a smaller coin than our farthing. In the reign of Elizabeth pieces of the value of three halfpence and three farthings respectively were issued. About the middle of the last century the copper coinage of the kingdom had got into so bad a state owing to the deterioration by hard usage and old age, the defacing of the devices, and the great encouragement this gave to the production of spurious specimens, it being reckoned in an official record of the period that no more than one fourth of the pence and halfpence in circulation were genuine, that business dealings became seriously hampered. Differences and disputes were constantly arising, leading to daily appeals to the law, and this went on so long in spite of petitions to Parliament, &c., that at length the higher traders took the law in their own hands and made a determined stand against accepting any payment which was not made in what was termed Tower money, the coinage being then minted in the Tower. This decided step however only led to greater confusion than before, as the great bulk of the labouring and other humble classes of the community were too uneducated to be at all capable of distinguishing the good from the bad, and the demand for the reform became at last so urgent that the wisdom of parliament had of necessity to be brought to bear on the problem. The expedient they hit on was a most extraordinary one; they allowed everybody to make their money for themselves. Any man who chose to make a thing he called a penny was free to do so, and government required it to be reckoned as a legal tender, no restriction as to size, device, quality of metal or any other consideration being required. This was too grand an opportunity to be lost, and everybody

at once began coining, the result being that the country was swamped with pence and halfpence of the most startling description. Public buildings, machinery, ships, political badges and numberless other things were stamped on this new token-coinage; it was speedily also found to afford tradesmen admirable opportunities of advertising their goods and the addresses where they could be procured. With our present system we find it difficult to realise such a state of things, but if we conceive ourselves emptying a handful of pence out of our pocket, all the pieces being a different size and thickness, and finding one stamped "Griffith's the safe man, 40 Cannon Street" another with "Daily Telegraph, the largest circulation in the World" and a third having an open book with the inscription "Good words are worth much and cost little" we shall perhaps comprehend the pitch which affairs had arrived at. Birmingham, then as now, was the great seat of manufacture for all kinds of fancy metal work, and the greater part of the new coinage was made there at the orders of the tradesmen of the whole country, and we derive some idea of the extent to which this new coinage was employed when we learn that in the first two years of the time it received government sanction, and was placed on an equality with the government money, Birmingham alone produced 600 tons weight of it. Renewed complaints followed quickly on this new state of things, and the government of the day again found it necessary to do something, but here at once a great difficulty arose, for the Mint was already fully employed, and owing to military requirements no further space within the Town could be given up for the extension of the Mint buildings. It was necessary therefore that the old state of things should be broken through and for the first time in the history of our coinage private enterprise was summoned to assist the government. After considerable discussion the contract of a firm in Birmingham was accepted and by the end of the first year they had coined for the government 500 tons of copper money. This coinage was very heavy, and from the broad flat band of metal surrounding the central device was known as cart-wheel money, in fact one of its great faults was that it was too good a pennyworth as its intrinsic value was such, that when sheet copper reached a certain price, manufacturers found it cheaper to melt the coinage down, and in this way many tons of the new money speedily disappeared.

In 1799, that is to say two years afterwards, a fresh issue was started, the coins being lighter, 18 instead of 16 pennies being made out of a pound weight of metal, and in 1805 a further change was made, 24 pence being then made from the same quantity of metal, thus lowering the intrinsic value while maintaining the nominal, and removing the temptation to melt it down for its worth as copper. One recommendation of the first coinage arose from the pound being made up into 16 pence, for as each was then just an ounce they could be employed as weights, and if anyone had a suspicion that his quarter

of a pound of tea seemed rather light, he could test the shopkeeper's scales easily and accurately by means of the money he proposed to pay for it. During the ten years Messrs. Boulton and Watt, the firm in question, were engaged by the Government, the copper coins, pence, halfpence, and farthings, produced by them, amounted in number to considerably over 300,000,000. This was a heavy blow and sore discouragement to the use of tokens, as the common people naturally preferred the government money from its uniformity of appearance and value to that of private speculators, and though tokens were from time to time issued till so late as 1812, their day was virtually over, and the public had for many years no further cause of complaint against their coinage.

In 1860, however, it was felt that from the accumulations of all sorts for the past 50 years, and the deterioration many of them had undergone, all sign of any device upon them being in some cases removed, and nothing but a flat disc of metal left, the time had again come for a complete revision of the copper coinage. The whole of this old money, 500,000,000 coins in number was therefore called in, a day was fixed when its further use would be illegal, a long period of grace however was allowed, as the day so appointed was the 31st of December, 1869, and in the meantime the issue of the new and present coinage was at once begun. It speaks well for the workmanship of the older money that Government applied to Messrs. James Watt and Co., of Birmingham (who I think we can have little doubt are descendants of the old firm, Boulton and Watt, though I am unable to say so positively, as I here quote from one of the numbers of the *Birmingham Post* for 1860, and this relationship to the past is not there alluded to), to supply them with 1,800 tons weight of the new coins, or about 800,000,000 of pence, halfpence, and farthings. In handling it we are at once struck by its lightness compared with the previous coins, of the lightest of those 24 went to the pound, but of the new coinage, 48, just double the number, are required to make a pound weight, or 80 halfpence, or 160 farthings. The advantages of the new coinage over the old are many, of these we may mention a few, uniformity, durability, lightness, economy of metal, artistic merit. It is also an advantage to have the value of the coin, plainly marked on it.

We turn our attention now to the various details we find stamped on the coin. In describing any coin the terms obverse and reverse are in constant use, the obverse is the side containing the principal figure, whatever it may be. In English coinage the obverse almost invariably has the head of the monarch in whose reign the coin is struck. Looking now more particularly at our halfpenny we thus find in the centre of the obverse a bust of the sovereign, an idealised treatment rather than a definite attempt at portraiture. Upon the royal robe you will notice an elaborate diapering of the rose, shamrock,

and thistle, the emblems I need scarcely say of England, Scotland, and Ireland respectively.

Surrounding this is a legend commencing with Victoria, the name of the Queen in whose reign the piece was struck, and followed by a series of abbreviations. The first of these D.G., stands for *Dei Gratia*, by the grace of God, as an acknowledgement of an over-ruling providence, the King of Kings. I am unable to say at what point of our history these letters were first struck upon the coins, but I find on looking over a series of the great seals of England, a new seal being made at the commencement of each reign, that they were introduced first upon the seal of Henry I, A.D., 1100, and have continued in use ever since. The next two abbreviations are BRITT. REG., this latter you will at once recognise as *Regina*, the Latin word for Queen. BRITT. you will notice is spelled with a double T; now *Britania*, the old Roman name for our country; has only one *t* in it; this doubling of the *t* is however a classical form of plural, (as for example *coss.* for *consulibus*) and gives greatly more force to the legend, its meaning being that she is Queen of all the Britains, (as the Emperor of Russia styles himself Czar of all the Russias,) not only of these little home islands, but of that mighty empire of which we, though the heart, are but a very small fraction, the sovereign of the 150,000,000 of Hindustan, and of other millions in Canada, Australia, China, and the wide world over.

The concluding letters F.D., are an abbreviation of *Fidei Defensor*, "the Defender of the Faith," the whole inscription therefore reads—Victoria, by the grace of God, Defender of the Faith, Sovereign of the British Empire. The title of "Defender of the Faith" was not in use until the reign of Henry the VIII, when it was bestowed upon that Monarch by Pope Leo X, as a reward for the celebrated treatise "The defence of the seven Sacraments;" a treatise compiled in reality by Gardiner and Sir Thomas More, but for which the King got the credit. The papal bull confirming the title is still preserved in the British Museum, and extols highly the zeal, the learning displayed, and the dutiful conduct of this worthy son of the church in thus defending the Faith against the assaults of Martin Luther and the other Reformers. Henry was so delighted with the distinction conferred upon him, that he continued to use it after he had both quarrelled with the Popes and denied their authority, ordaining by Act of Parliament that the royal title henceforth and for ever should be "Henry VIII by the grace of God, King of England, France and Ireland, Defender of the Faith, and of the Church of England and Ireland the supreme Head." In Dr. Fuller's church history we find the following story bearing on this title:—The court fool, seeing the King one day in very exuberant spirits, ventured to ask him the reason, and the King telling him that he had had an honour conferred on him above any of his predecessors, and that the Pope had made him Defender of the Faith, the fool replied—

"Prithee good King let thee and I defend one another and let the faith alone to defend itself." The court fools you will remember were allowed a licence of speech which, exercised by any one else, would very possibly have ended in a journey to Tower Hill.

In some few of the inscriptions on early coinage, the moneyers have not been careful to remember that everything must be reversed on the die, so that when the coin is struck off all the details may come the right way; in the case of a head it did not much matter if it after all looked to the right when the designer meant it to look to the left, but when all the letters of an inscription are turned the wrong way, it becomes a more serious matter. On some Greek coins where an inscription fills the centre of the disc, it is written in what the classical writers termed ox-turning fashion, that is to say, the lettering ran in alternate directions, so that your eye glances from left to right in reading the first line, then from right to left along the second, from left to right again in the third, and so on in alternate directions to the end of the inscription like an ox as the name implies pacing alternately up and down while ploughing.

Having now I think exhausted all the points of interest on the obverse, we will turn to the reverse. Here we notice in clear legible characters the value of the coin, one penny, or halfpenny, as the case may be, and the date at which the coin was minted. The centre of the piece is occupied by a sitting figure emblematic of Britannia, the trident, lighthouse, and ship, being illustrations of a nautical life, and symbols of our maritime supremacy. The shield by the side of the figure, and upon which the right hand rests has the familiar device we see on our national flag, the union jack, but this unfortunately on our coinage is wrong heraldically, the cross of St. George for England, and St. Patrick for Ireland, being alone represented on it, and the Scottish cross of St. Andrew being omitted. As I hope at some future time to read a paper on heraldry for the benefit of the beginners in our archæological section, and as without this heraldic knowledge it would take longer to explain this matter to you than it is worth, I will pass on, simply begging you to accept my assertion now that it is so.

Many of my audience are probably not at all aware of the antiquity of this personification of Britannia. It first appears on the coinage of Antoninus Pius, who died A.D. 161, where we find a sitting figure, her arm resting on the edge of a large shield by her side, in one hand a standard and in the other a javelin, the whole in effect being singularly like the figure we are so familiar with on our modern coinage. To prevent possibility of mistake, in the space occupied in our present coinage by the date is the abbreviation "Britan." The representation of Britannia, however, disappeared after this for a space of 1500 years, when it reappears on the copper coins of Charles II, the head of the figure being engraved as a likeness of the Duchess of Richmond.

On our English money, and in fact on all modern money, it will be found that the figures are represented in profile, or, as we should ordinarily say, in a side view; till the third century this was the invariable custom, but later on, and throughout the mediæval period more especially, we meet from time to time with examples where the full face is turned towards us. While the device on the obverse in the coinage of the past is almost invariably the head of the sovereign or that of the tutelary deity of the city or state, the design on the reverse is subject to great variation; thus on a coin of Athens we have the owl, on a coin struck at Corinth the winged horse, on a coin of Cyrene a plant which was the chief article of export of the city, while many give representations of celebrated buildings or statues; thus on one of the Athenian coins we find the Parthenon, on one from Corinth the celebrated statue of Venus Victrix, while a Thracian coin has the famous Farnese Hercules, one of the first favourites of antiquity we may fairly judge, from its frequent repetition on gems and coins, and in bronze and marble. We in several cases thus gain from coins some further idea of the famous statues or other works of art of antiquity, of which writers have left vivid description, but of which the originals have long since perished. St. George, our patron saint, appears in conflict with the dragon on some of our sovereigns.

I had intended in conclusion to have mentioned some of the various products which the subject of our paper would purchase for us—of the exhaustive labour which many are forced, owing to trade competition, to give for pay so small, of the little children who work long hours making match or fusee boxes for sadly too few halfpence a thousand; of the energy which will supply us, as in the "Echo," with several sheets of original literary matter for one halfpenny, of the massive bridges costing thousands of pounds in their construction which the ever recurring toll half-pence of the public have long since paid for over and over again; of the proverbial fact that one may be "penny wise and yet pound foolish" and of the other very common proverbial expression of morality, "in for a penny in for a pound;" but all these things I must now leave undwelt on. My main desire in writing this paper has been been to endeavour to show first that from the most commonplace things some points of interest may, as I trust you will have felt, be evolved, and secondly to encourage others amongst the working Members of the Society to take some of the simple objects about them as the subject of their papers, for while some may fear that unless they give us some profoundly learned physiological paper, a matter for which they have neither time nor full opportunities of study, their contributions will not be welcome—they are I think unjust to themselves and to us, for I am persuaded that the history of a piece of chalk, a bottle cork, the bettle itself or fifty other things which are lying about us would afford ample material for a short paper (and let me here gently hint my opinion

that our papers as a rule, and this is no exception are a little too long, the prospect of preparing one being thus rendered more alarming) and that at its close the thanks of the Society would be as cordially given as they would have been legitimately earned.

N. Whiting was elected a member.

There were 43 persons present: 3 Honorary Members, 26 Members, 2 Associates, and 12 Visitors.

MEETING HELD OCTOBER 20TH, 1871.

THE minutes of the previous Meeting were read and confirmed.

The President announced,

1.—That the Committee had decided to have the Paper at a Meeting read before the Exhibitions.

2.—That no member of the Society would be allowed to look after a bed in the Garden till next year.

3.—That, the Master having contributed so liberally towards the expenses of the Conversazione, Members who did not pay 1s. 6d. during the next fortnight, or who did not shew a leave from home to have 3s. charged in the School bill, would be fined 1s. 6d. to pay their share of the cost of the Field-Day not borne by the Society.

4.—That Buckley, Loring, and Hopper were excluded from the Society, for non-payment of subscriptions and non-attendance.

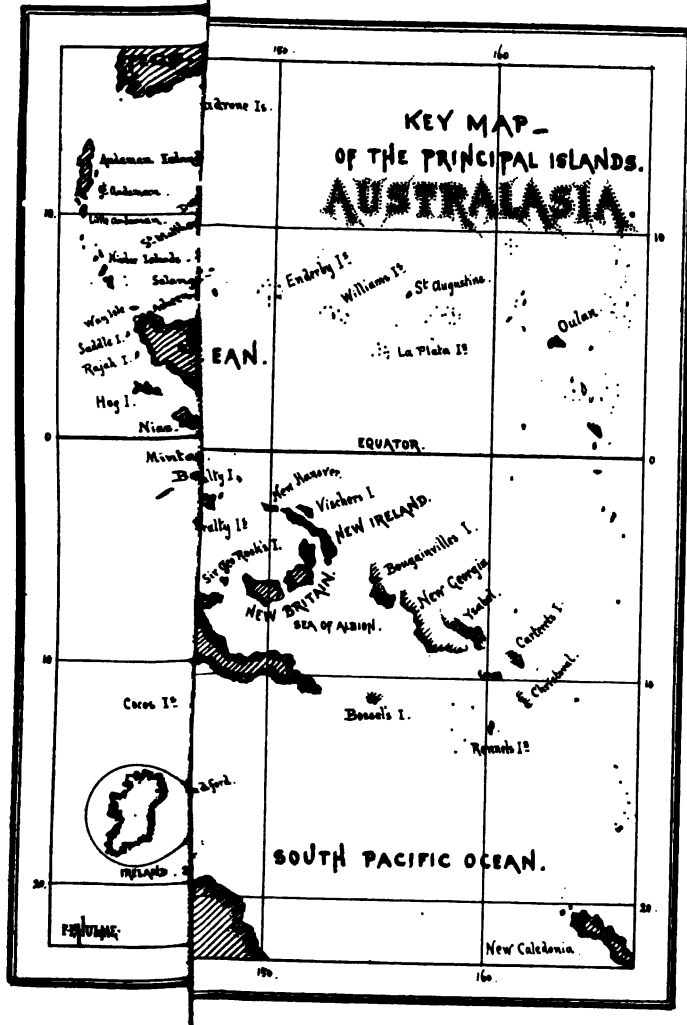
5.—That J. Simpkinson, was elected a Member, and F. A. S. Austin, Esq., was elected an Hon. Mem.

A. Babington, Esq., then read the following paper on

THE MALAY ARCHIPELAGO AND ITS INHABITANTS.

Some time ago I read a paper to the Society on the subject of Savages, and as I believe that it proved not wholly uninteresting to the members who heard it, I shall make no apology for continuing the subject.

In the paper to which I have referred I took the Kaffirs as an illustration of the condition of man in his savage state, because they seemed to me to furnish a very typical and at the same time a very simple illustration. To-day I shall take you to a very different part of the globe. The Kaffirs are interesting almost exclusively on their own account, and not by virtue of the


KEY MAP_
OF THE PRINCIPAL ISLANDS.
AUSTRALASIA.
150.
160.
10.
0.
20.
Admiralty Islands
Solomon Islands
Kingsmill Islands
Ellice Islands
Enderby I.
Williams I.
St Augustine
Oulan
La Plata Is
EAN.
Hog I.
Nias.
EQUATOR.
New Hanover
Vischers I
NEW IRELAND.
Bougainville I.
New Georgia
Sir Geo Rooke I.
NEW BRITAIN.
SEA OF ALBION.
Cocos Is
Bossels I.
Rennels Is
SOUTH PACIFIC OCEAN.
IRELAND
PENINSULA
New Caledonia

land in which they dwell; but the Malay Archipelago is fully as interesting as the inhabitants who people it, and I have therefore divided my subject into two heads, firstly, the Malay Archipelago, and secondly, the dwellers on it.

You probably know very little about the Malays or their country, and I can assure you that the Malays heartily reciprocate the compliment. Mr. Wallace, the famous English naturalist, tells an amusing story as evidence of this. A number of his Malay friends once clustered round him and begged him to tell them the name of his country; he complied with the request, but after a dozen desperate efforts they found to their astonishment that they were unable to pronounce the word. At length one old man, with an obstinate incredulity rivalling that of Betsy Prig when she told Mrs. Gamp to her face that she believed "there never was no sich person," evidently regarding England as the Mrs. Harris of geography, indignantly exclaimed: "Unglung! That can't be the name of your country! Who ever heard of such a name? Unglung! why it's unpronounceable! Now I'm a man of Wanuambai, anyone can say Wanuambai, but who can say Unglung? Don't tell me! You're joking with us." But if they were incredulous about the name of our country, they were equally incredulous about our tastes. Our Natural History Society, were they to hear of its existence, would certainly be regarded as a myth by the Malays. They could not believe that Mr. Wallace was serious when he said that he collected his specimens for his countrymen to look at. What could his countrymen want with a few nasty ugly beetles and moths? They who produced such wonderful things as knives, and calico, and glass beads. At last one of the bystanders leant forward and said in a mysterious voice, "When you go home these things in your boxes come to life again, don't they?" Mr. Wallace endeavoured to pooh-pooh and laugh off the question, but the man was not to be baffled: he evidently considered that he had guessed the great secret, for solemnly shaking his head he repeated the words "Yes, they come to life again! that's what they do! They come to life again! that's what they do!" Here is a terrible blow to our vanity! One of the most illustrious of English entomologists regarded as a mere vulgar conjuror, who poisons and impales worthless beetles merely that he may wile away a tedious hour by revivifying their camphorised and pin-bound bodies. You know now what the Malays think of you. I hope that by the time I have finished my paper, you will have formed a juster estimate of them.

The Malay Archipelago stretches in an almost continuous line from the south of Asia to the north of Australia. It is 4,000 miles from East to West, and 1,200 from North to South. It occupies as much space as the whole of Europe from the extreme west of Ireland right away to Central Asia. The whole of England, Scotland, Wales, and Ireland, including the Irish Channel, might be put down in the middle of

Borneo, and yet there would be plenty of room to spare all round. New Guinea is larger still. Sumatra is twice the size of England. Java is larger than Ireland. There are eighteen islands as large as Jamaica, and more than a hundred as large as the Isle of Wight.

I cannot pretend in the limits of a single paper to exhaust my subject, for the Malay Archipelago teems with all the countless marvels of tropical scenery and tropical life. Here are primæval, virgin forests, stretching for hundreds of miles, where the axe has never been laid to the roots of the trees, and where man's footfall has never echoed. Here are beaches of dazzling whiteness, washed by waves of the brightest blue and the deepest emerald. Here are cliffs clad in the most luxuriant vegetation, majestic ferns, not like the dwarfed and stunted plants in which the deer of Savernake couch, but loftier than the goal posts which tower over Big Game. Here are the gorgeous birds of Paradise with crimson plumage, necks of the most dazzling emerald, and heads and wings of golden hue. Here are mountains heaving with volcanic fires, down whose sides flow rivers of boiling water. Here are swarms of ants, so numerous and so bold, that they will carry off your breakfast from under your very nose. Here you may go to bed at night and wake in the morning to find half-a-dozen centipedes and millepedes, each three inches long, nestling quietly in your hair, and a venomous little scorpion comfortably curled around your ancle. Here, lastly, (I fear I shall make the mouths of all the entomologists water) here is the El Dorado of the coleoptera and the lepidoptera, of the beetles and the butterflies. Here you may go out in the morning for your early walk, and see sailing towards you the great bird-winged butterfly, the *Ornithoptera Poseidon*, monarch of the butterfly kingdom, seven inches across from tip to tip, with golden body and crimson breast, and wings of velvet black and brilliant green. Or, as the shades of night come down, you have only to place a lamp in the window of your room, and the moths will stream in by the hundred and the thousand, till in your excitement and bewilderment you know not which to pin and which to bottle. And as I read Mr. Wallace's account of the capture of two thousand different species of beetles on a single square mile, I could only exclaim with a deep sigh, "Would the Malay Archipelago might form the scene of our next field-day!"

I wish first to say a few words on the geological peculiarities of the Malay Archipelago, and I hope you will none of you be alarmed at the word geological, for as I have the best reasons for believing that all of you know at least as much geology as myself, it is pretty clear that what was perfectly intelligible to me will also be perfectly intelligible to you.

It is a well-known fact that great changes are and always have been taking place on the face of this globe. In our own island for instance within

the last 2000 years the sea-coast near Dover has completely changed, and is totally different now from what it was when Cæsar landed. If we go still further back we shall find that the changes were still greater. In some places islands have been upheaved by the agency of mysterious forces from the bottom of the sea. In others, peninsulas have been violently severed from a continent and changed into islands. This has been the case with England; it has also been the case with Corsica and Sardinia. And to this process beyond all question may be traced the origin of the Malay Islands.

But you will ask me—what evidence is there of this? how can we know whether an island came up from the bottom of the sea, or whether it was originally connected with the mainland? The answer is very simple: there are two cardinal tests to determine if an island belonged within recent times to the neighbouring mainland. (1) It is highly probable that the sea which separates the two will be shallow, and (2) it is quite certain that the animals, the birds, the plants, and the insects, will be, if not absolutely identical, at least extremely similar. Take our own country as an instance. We may be quite sure that England, not many thousands of years ago, was part of Europe, first, because the straits of Dover which sever England from France are very shallow; and secondly, because the animals, the birds, the insects, and the plants in our own country, are almost the exact counterpart of those on the continent of Europe.

But I have already told you that the Islands of the Malay Archipelago stretch from Asia to Australia. And therefore the very obvious question suggests itself, did all these islands belong to Asia or all to Australia? or did some belong to one and some to the other? and if so, which belonged to which? By applying our two tests we get an instant solution of the difficulty. First, we find that the sea which severs the large islands of Borneo, Sumatra, and Java from the mainland of Asia, and from each other, is extremely shallow. Beyond Borneo and Java we come to deep sea again, till we reach Papua or New Guinea. There we find that the sea which divides New Guinea from Australia is again extremely shallow. From this we should suppose that Borneo, Sumatra, and Java originally belonged to Asia, while New Guinea originally belonged to Australia. Is this supposition, then, confirmed by our second test, the resemblance between the animals and the birds? It is, and in a remarkable manner. You know, perhaps, that no two parts of the world differ more completely in their animals and their birds than Asia and Australia. Australia, indeed, in this respect, stands quite alone in the world. It has none of the familiar quadrupeds which we find almost everywhere else, horses, sheep, oxen, cats, dogs, wolves, deer, monkeys. Its indigenous animals are marsupials, that is, those animals whose young are, as it were, prematurely born and nourished in their mother's pouch till they are able to take care of

themselves. Such are the kangaroo, the flying opposum, the wombat, and that strange animal the Ornithorynchus, or duck-billed Platypus, which the observant among you may have seen on the table at the end of the Library, at our last Conversazione. The birds of Australia are equally peculiar. It has no woodpeckers and no pheasants, which are found in every other part of the world, but, instead of them, brush turkeys, cockatoos, honey-suckers, and black swans, which are found nowhere else. If we examine the islands which I have mentioned, we shall find that Borneo, Sumatra, and Java, which are divided from Asia by a shallow sea, have the same kinds of animals and birds; while the birds and animals of New Guinea, which is divided from Australia by a shallow sea, are almost identical with those which belong to Australia alone.

This, however, is not the only geological fact for which the Malay Archipelago is remarkable. Through it runs one of the greatest belts of volcanoes which exist on the surface of the globe. Indeed the island of Java, the Eden of the East, abounding with all the most splendid plants and insects of the tropics, more thickly populated by far than England, has been simply created by the action of volcanic fires. From time to time the presence of these displays itself in the most awful forms. One mountain in Java, nearly 8,000 feet high, that is, twice the height of any mountain in England, Wales, and Scotland, was in the year 1772 literally blown up by repeated explosions, and a large lake left in its place. The huge mass actually disappeared under the surface of the earth, carrying away with it about 90 square miles of the surrounding country, 40 villages, and 3,000 of their inhabitants. Another volcanic mountain in the neighbouring island of Sumbawa, in the year 1815, destroyed 12,000 people by its eruption, which continued from the 5th of April till July. The explosions were heard at a distance of 970 miles; in Java, at the distance of 300 miles, the darkness during the day was like that of deep midnight, from the quantity of ashes that filled the air; and some were even carried to Bencoolen, a distance of 1,100 miles, which is as if the ashes of Mount Vesuvius were to fall in Birmingham. In one of the Molucca islands, 224 years ago, a volcanic eruption split a huge chasm deep into the heart of the mountain. After remaining in a quiescent state for more than 200 years, during which twelve populous Malay villages were built along its sides, the volcanic fires broke forth again, destroying nearly all the inhabitants and spoiling even the crops in the neighbouring islands.

Of the animals which are found upon these islands I shall only speak of one, which from every point of view is the most interesting. An eminent member of this Society purposes, I believe, before the end of the half, to read a paper on Mr. Darwin's celebrated theory. Till he has determined whether we are or are not the cousins 5,000,000 times removed of the orang-outang, I

shall offer no opinion on the subject. But I think we shall be all agreed that it is a matter of great moment to us to know something of the habits of a member of the animal kingdom whom we may have at some future day to embrace, if not as a man, at least as a brother. The orang-outang, which is the Malay word for man of the woods, or the mias, as he is more commonly called by the natives, and as I shall for convenience sake call him, is confined entirely to the islands of Borneo and Sumatra. His height never exceeds four feet two inches, but this shortness is more than compensated by the extraordinary length of his arms, which measure seven feet eight inches from tip to tip. He lives almost entirely in the forests, which is perhaps the reason why he is not found beyond those two islands. He rarely descends from the trees, his mode of progression being to walk along the large branches; and whenever he has reached the end of one he stretches forth his long arms, grasps the next, swings himself on to it by a powerful muscular effort, and continues his course. Thus without the least exertion he will move at such a pace that it requires a brisk trot to keep up with him on the ground below. He feeds almost entirely on unripe fruits, apparently enjoying them most when hard and sour. He is not, like many other classes of monkeys, gregarious, at least Mr. Wallace relates that he never saw two full-grown males together. Their strength and tenacity of life sound quite fabulous; in the case of one at which Mr. Wallace had shot several times, it was found that the arm had been completely shattered, the spine had been broken, and two balls had been flattened inside the skull, and yet the creature was alive when they picked him up. As to his strength, Mr. Wallace quotes the words of an old Dyak chief, who lived near the spots where the animal was most commonly found, and I will quote them in turn: "No animal is strong enough to hurt the Mias, and the only creature he ever fights with is the crocodile. When there is not fruit in the jungle he goes to seek food on the banks of the river, where there are plenty of young shoots that he likes and fruits that grow close to the water. Then the crocodile sometimes tries to seize him, but the Mias gets upon him, beats him with his hands and feet, pulls open his jaws and rips up his throat." It is difficult to conceive any greater exertion of strength in an animal than is implied in standing upon a crocodile's back and tearing open its powerful jaws by main force. If we are really akin to the Mias, we must fain confess that our intellectual development has gone on side by side with our muscular degeneracy.

As to the natural products of the Malay Archipelago, I shall select two of the most remarkable, the sago tree and the bamboo. The sago tree is a species of palm with immense spiny leaves twelve or fifteen feet long, and sometimes as thick as a man's leg in the lower part. You will easily conceive that leaves of such enormous size and strength are extremely useful, and in

some cases houses may be entirely built of these leaves with the exception of the wooden framework. The thatch, the flooring, and the panelling, are all supplied by them. They are much less expensive than boards, and much more easily cut into shape: they require no paint or varnish, and never shrink or warp. But it is the trunk of the tree which gives all its value to the sago palm. When sago is wanted a full-grown tree is cut down, the leaves are cleared away, the outside bark is taken off, and the pith beneath it laid bare. This pith is then cut out and ground into a coarse powder, after which it is thrown into a wooden trough where all the sago starch is filtered and strained through, and the fibres thrown away. When a sufficient quantity of starch has been obtained it is kneaded into great lumps of about thirty pounds weight, and sold as raw sago. This may be prepared and eaten in several ways: first, it may be boiled with water until it becomes something like Scotch porridge, in which case it is eaten with salt, or secondly, it may be cut into slices and baked for five minutes in a clay oven, and then if flavoured with sugar, butter, and grated cocoa-nut it makes a little dish fit for an epicure; or thirdly, if they are not wanted for immediate use, the cakes may be laid out in the sun to dry, and tied up in bundles of twenty or thirty to put away in the storehouse. In this state they will keep for years, but though at the end of that time (as might be expected) they are extremely hard and extremely dry, the little Malays munch them very complacently, as English children may be seen contentedly gnawing the crust of a stale loaf.

There are two things I think, which are specially noteworthy in the sago palm. First, there is something very astonishing in the thought of the entire trunk of a great tree being converted into good, wholesome, nourishing food for man; and secondly, what is perhaps more wonderful still, is the price at which this can be done. A sago tree costs seven and sixpence: it takes a man ten days to extract the sago from it: a day's work in the Malay Archipelago costs fivepence: ten times fivepence make 4*s*. 2d., 4*s*. 2d. and 7*s*. 6d. make 11*s*. 8d., and for this sum a man can obtain 600 pounds of sago, enough to keep him in health and comfort for a whole year. Therefore, if any of you should ever go to the Malay Archipelago, you will be able to live for 12 months upon the same sum which you would expend at Mr. Foster's upon twelve pots of jam or six jars of pickle. And the results of this are, as you may imagine, very injurious to the natives. Try, for instance, to picture to yourself what the effect would be if each of you could learn enough classics, mathematics, history, and French, in ten days to last you for the whole year. Charming though the experiment might seem on the first trial, you would not improbably repent of it before long. Nothing but punt-about, and cricket matches, and fives-playing, and racquets, would inevitably produce a general intellectual idleness; and in like manner wherever the sago palm is largely

cultivated, the unfailing consequence is physical idleness with its natural results, misery and degradation.

If the sago palm supplies the Malay with one half of their needs, the bamboo supplies them with the other. This wonderful plant grows in the greatest perfection in the torrid zone, and therefore may be seen in the Malay Archipelago in its richest luxuriance. It varies in height; sometimes it is 20, sometimes 40, sometimes 60, sometimes even as much as 80 feet high. The thickness of the stem varies from 5 inches to 15 or 18 inches in diameter. Down its whole length it is divided into joints, separated from each other by thick knots, some of these joints being only one foot, some a couple of yards in length. The stem is always perfectly hollow, and as smooth outside as if it had been polished.

The Bamboo grows with marvellous rapidity; sometimes it shoots up three or four inches in a single day, sometimes as much as 20 feet in 5 weeks. Thus it reaches its full size by the end of the year, and the only change which comes over it after that time is that the wood of the stem grows harder and more solid.

The Bamboo, therefore, has every quality which can recommend it for man's use. It is straight, light, smooth, round, hollow; it grows into all sizes; it is extremely hard; it can be pierced with holes with the greatest ease; and it rises from the earth with a rapidity which no other plant or tree can rival.

By the Malays these valuable properties have been taken full advantage of. When it first springs up its soft and succulent shoots are cut and served up at table like asparagus. As the plant grows older a delicious juice is secreted in the hollow stem which forms a summer drink like lemonade. The sap of the leaves is a cure for coughs and sore throats, and the bark is a specific against low fever. The full grown plant may be split up into its separate joints, in which case it forms excellent natural buckets, half a dozen of which stand in the corner of every Malay hut: or else they may be used for saucepans, in which rice or vegetables can be boiled to perfection: or finally, they may be converted into pots and jars for preserving jams, pickles, and potted lobster. From some which are particularly light and slender the natives obtain arrows: from some, bamboo pens are cut. Owing to its extreme flexibility and divisibility (for it can be split like whalebone from top to bottom into strips of uniform breadth) it is employed almost exclusively in the manufacture of hen-coops, bird cages, chairs, hats, sofas, and fish-traps. Houses may be built of it from topto bottom. Uncut, the bamboo forms strong pillars and posts: split up it serves for rafters to support the thatch, or, interwoven with lattice work, the sides of rooms may be constructed out of it, admitting both light and air, or it may be laid down as flooring, delightfully

smooth and clean, and by its slightly circular form giving a firm foothold. It is employed in all sorts of shipping; and as entire houses may be built out of it, so also may entire ships. Lashed together they form the hull; and masts of any size can be supplied from it as occasion requires. In Bengal, a boat may be fitted with masts and yard for exactly half the sum of your weekly allowance: if masts are required for larger vessels, several bamboos are fitted into each other, or one of the largest size is used, its strength and lightness specially recommending it. But one of the most general uses to which the bamboo is put by the Malays is in the making of bridges. The hill country of Borneo is full of gullies, ravines, and small rivers which are liable to be dangerously swollen by sudden rains. By the help of the bamboo the natives can cross gully and river alike with the greatest ease. On either bank are fixed two stout bamboos crossing each other in the shape of an X. Another long bamboo is laid on the two forks and bound firmly to them. This constitutes the bridge: but for greater security's sake, yet another slender bamboo is fastened to the top of the X's, and serves as a hand-rail to steady the footing of the passenger. To ensure still greater safety a spot is chosen where a tree overhangs the river, and the horizontal bamboo is fastened again to a strong bough. Should the bridge give way or show signs of approaching dissolution, the materials are always close at hand for repairing it at an hour's notice. Sometimes, where the road lies over swamps and morasses, these bridges are carried for thousands of yards, and the natives prefer them to an ordinary footpath, carrying the heaviest burdens over them with a foot that never falters. I have told you enough of the bamboo to enable you to endorse the opinion of an intelligent observer: "All that composes a bamboo is profitable, of whatever species it may be. Its uses are so numerous, so various, and so beneficial that it is impossible to conceive how tropical countries could now dispense with this precious reed. It is no exaggeration to affirm that the mines of the vast empire of China are of less importance to it than the possession of the bamboo." For my own part it is only quite recently that I have arrived at the conclusion (which I dare say you have arrived at) that it is the most wonderful plant on the face of this earth. Indeed I have failed to discover anything which can *not* be made out of it, except perhaps a polygon puntabout.

I have said enough about the Malay Archipelago, and I will now pass on to its inhabitants. And in dealing with this second part of my subject I shall confine myself to a very limited area, viz., the Dyaks of Borneo. And this for several reasons:

(1) The number of different tribes into which the Malay Archipelago is subdivided is so large that it would be impossible in a single paper to notice them all.

(2) Many parts of the Archipelago have been so long exposed to civilising, christianising, and European influences that the name of savages could only be applied to them in a very limited sense.

(3) The Dyaks of Borneo are especially interesting to us because it was amongst them that one of the noblest models of English governors, Sir James Brooke, the Rajah of Sarawak, toiled for many years with a self-denial, an energy, a high-mindedness, a singleness of purpose, a contempt of obloquy, and a fearlessness of danger, such as even English governors have seldom exhibited.

(4) Borneo, which is (as I have already said) considerably larger than all the British Isles put together, rich in coal mines, rich in all the gifts of nature, with a healthy climate, and lying in the very highway of one the greatest commercial routes in the world, will doubtless at some future period become the centre of a great empire. And it scarcely needs a prescient eye to foresee that the day may come, say two thousand years hence, when the President of the Natural History Society of the Borneo Seminary for young gentlemen will read to the members of that distinguished society a lucid and an interesting paper on—"A visit to the ruins of Marlborough College."

The Dyaks are closely akin to the Malays, and may be taken as fair representatives of the Malay family. Their height is below that of an average Englishman, and their face is almost effeminate from the smoothness of the cheeks and the beardlessness of the chin; now and then, a Dyak finds two or three hairs growing on the upper lip, of which he is as proud as a schoolboy under similar circumstances. But small and slight as their figures are, their strength, their wiriness, and their capacity for enduring the greatest fatigue are almost inconceivable. I have already described the bamboo bridges which are constructed all over the hill country of Borneo. To cross these bridges would, as you may well imagine, tax the powers of a professional rope dancer. Yet a Dyak will take up a 13 stone European, and carry him on his back for several hundred yards over those slippery and swaying bridges with a foot which never stumbles, even over places where a single false step would prove fatal to both. Of their power of carrying burdens up perpendicular hills fabulous stories are told. On one occasion one of these men, while acting as camp follower to a detachment of English soldiers, displayed his powers in a remarkable manner. The English sergeant, a hardy veteran, who had made many forced marches in India and China, broke down at the first of these tremendous hills, and declared it to be absolutely impossible for him to continue his march under the load which he was then carrying. The officer in command of the party offered one of the Dyaks an extra half-ounce of tobacco if he would take the sergeant's burden in addition to his own. He was already

carrying his food for three weeks, his whole store of clothes, one 12-pound shot, two 12-pound cartridges, a double-barrel gun, a hundred rounds of ball cartridge, and a heavy Dyak sword and spear. But this load, enormous as it sounds, seemed to be a mere trifle to this active porter, who flung the sergeant's kit on to the top of the whole, and continued his journey up and down hill with an agility and cheerfulness that never flagged, over places which the English soldiers could scarcely traverse, even though carrying nothing but their own weight. Some of you may remember that, when we were discussing the qualities of the Kaffirs, we observed that a savage state of life seemed to develope the physical powers to a degree which we, even with our so-called barbarous game of football to help us, can only marvel at.

As to the social life of the Dyaks, I have already mentioned the construction of their bamboo houses. These houses are almost invariably raised on posts to a height of about 20 feet from the ground. There are several reasons for this practice: first, it converts the house into a natural fortress, which has frequently resisted the attacks of even British soldiers, except when supported by artillery. The posts on which the house is built are made of the hardest iron wood, and while the enemy is attempting to cut them down, he is overwhelmed with such a storm of missiles from above that he is generally compelled to desist. In the second place, the houses are by this means protected from sudden floods and from the intrusion of noxious reptiles. And thirdly, a Dyak avoids the necessity of carting away all his dirt and refuse by the simple process of a natural dust-heap below the floor; and though the result of this is particularly unpleasant to the European sense of smell, the well-trained nose of the Dyak is impervious to any such sensations. These houses are often 300 feet in length, and are divided into 60 or 70 rooms on the same principle as the flats of large houses in London, with this difference that the Dyak flats are all on the same story.

The dress of the Dyak does not at all emulate the simplicity of his architecture. It is true that his actual clothing is not very formidable, consisting generally of a jersey worn round the waist. But this simplicity is amply compensated by the number and variety of ornaments which he heaps upon his person. Like all savage and almost all, if not all, civilized nations, the Dyak is firmly convinced that nature is nothing unless it be assisted by art. In fact, he seems to have anticipated the philosophy of Dr. Pangloss in Voltaire's novel, who argued that our noses were meant to carry spectacles, hence we had spectacles; our legs were designed to wear breeches, hence the origin of the tailor's art. In like manner the Dyak argues, what is the use of ears, except to stick half a dozen brass rings in? What is the good of a nose except to run a skewer through? and why have teeth at all if they are not to be filed down

and blackened by all sorts of juices? This filing and blackening of the teeth which might seem to us the least pleasant and the least beautifying of all processes, is an indispensable essential of the toilette of the Dyak dandy. The juice with which the teeth are blackened is procured from a piece of dried wood by the simple process of holding it over a hot fire till a black sap exudes. Once blackened with this, the teeth resist for all time even the seductive blandishments of Mr. Macassar's unrivalled odonto. Having thus ornamented his teeth he proceeds to enhance the charms of his ears; he perforates them from the top to the bottom with punctures of varying sizes, into which he inserts rings of corresponding dimensions. To these rings are attached miscellaneous objects. Thus the son of a noted chief suspended from the bottom of one ear two little bells, three small brass rings, part of a cockatoo's beak, two boar's tusks, and an alligator's tooth. The legs and arms are adorned in a fashion which does not disgrace the ornaments of the head. Both alike are covered with numberless brass rings: to the end of the garment round his waist are hung rows of agate beads and bugles which tinkle merrily at every step. His neck is loaded with a profusion of bright beads, and his knees are encircled with repeated coils of brass wire. This, by the way, might furnish a useful hint to some of our Marlborough football players.

The Dyak ladies by no means fall short of the Dyak gentlemen in their love of dress and their worship of the beautiful. Their arms from the elbow to the waist are encircled with a huge brass bracelet. Their neck is surrounded with half a dozen and their body with a dozen coils of agate beads. Their ears and teeth lack none of the graces which art has conferred on their male compatriots. Hence the Dyak belles scarcely realise our English ideal. "When a Dyak lover," says an English observer, "attempts to pass a tender arm round his sweetheart's waist, instead of the soft flesh he finds himself clasping a cuirass of solid metal. Nor is this all: for if in her turn she encircles her lover's neck with a responsive arm the wretched man finds himself clasped by a horrible fetter, which draws a little bit of the flesh between each of its links and pinches him fearfully." At times this practice of excessive ornamentation leads to the most disastrous results. On more than one occasion a Dyak lady who has fallen out of a boat has been dragged to the bottom by the weight of her trinkets. But these warnings are altogether thrown away on the haughty beauties. If the ancient Roman thought that it was sweet and glorious to die for his country, the Dyak maiden thinks that it is still sweeter and more glorious to die for her agate beads.

The moral character of the Malays is undoubtedly high. To begin with, they are remarkably truthful. For this reason it is often impossible to get any definite opinion from them: "If I were to tell you what I don't know,"

they say, "I might tell you a lie." This is the more remarkable because amongst savage nations lying and deceit are admired as proofs of intellectual ability, and not denounced as a moral sin. So in Homer it is for this quality that the character of the wily Ulysses is specially held up for our commendation; and the poet seems to think that much of his greatness consists in being able to tell the biggest possible fibs at the shortest possible notice. In the second place, unlike many savage races, the Dyaks are remarkably temperate. The coarse sensuality which is the surest mark of uncivilised man is almost unknown amongst them. And except on solemn feast days, when it is considered a point of honour not to pass the bottle, the Dyak is rarely intoxicated. But besides this there is a certain chivalrousness in their character which comes out most strongly in their customs relating to marriage. A wife among the Dyaks is not simply bought in exchange for so many cows or so many beads: she is wooed by her lover with as much ceremony as an European maiden. He begins his attentions not by putting on her shawl or handing her into the carriage, but in a more practical fashion by helping her to drive her pigs or assisting her to carry her load of wood. When he considers that he has in this way made sufficient progress in the lady's affections, he ventures on a final step which is equivalent to popping the question. At the dead of night he steals in through the back-door to the spot where his lady love is peacefully reposing under her mosquito curtains. If she sits up and talks with him, it is a delicate way of saying "Yes": if she asks him to light the lamp or blow up the fire it is a delicate way of saying "no," and the unhappy lover has nothing to do but to slink away with tears in his eyes and anguish at his heart.

The superstitiousness of the Dyaks is one of the most remarkable features of their character. But it does not betray them into any of the revolting practices which are unhappily so common among wild tribes. They have no cannibalism, no unnatural mutilations, no human sacrifices. In the importance which they attach to the cries and flight of birds they only rival the heroes of the Iliad, Romulus and Remus, or the shepherds of Virgil's Eclogues. But no omen is so fatal as the cry of a deer. It is sufficient to break asunder even the most tender ties of married life. One of the Missionaries tells an amusing story in illustration of this. He went to pay a visit to a young Dyak who had been married only three days before to a girl whom he loved passionately and who fully returned his affection. To his surprise the Missionary found the newly-wedded spouse sitting alone, hard at work upon a large bracelet which he was manufacturing out of brass wire. "Where's your wife?" was the first question he asked. "She's left me," was the mournful reply. "Left you! why I thought you loved each other immensely?" "So we did; but last night we heard a deer cry, and after that we came to the

conclusion that we couldn't live together any longer." "But aren't you very sorry?" asked the visitor. "Awfully sorry," was the heart broken reply. "And what's that you're making with the brass wire?" continued the questioner. "What's this I'm making?" rejoined the inconsolable widower. "Oh, it's only a present for the new wife whom I'm going to marry to-morrow."

Akin to this belief in omens is the superstitious value attached to ordeals as means of deciding disputes. These ordeals were extremely common in the middle ages, the superstitious ages of Christianity. Many of you will remember the ordeal fight in the "Talisman," when the Knight of the sleeping Leopard proves on his body the falsehood of Conrade Montserrat, and the ordeal fight in "Ivanhoe" where the Saxon Knight defends the honour of Rebecca against the Templar. But the ordeals of the Dyaks are of a less lofty character. One way is for both parties to get up to their chins in water. At a given signal they duck their heads simultaneously, and the one who is compelled to come to the top again first is considered to be beaten. Another way is for each party to take a lump of salt: both are put into the water at the same moment, and the owner of the piece which retains its shape longest is held to be the winner. A third way is for each party to take a snail and put it in the middle of a plate: lime juice is then poured over them, and the snail which possesses the most sensitive horns and moves first, puts its owner in the wrong.

But what seems to me the most wonderful of the Dyak superstitions is that connected with white men. As soon as an European enters a Dyak village he is seized upon, forced into a chair with a gentle coercion, and stripped of his shoes and stockings. His feet are then carefully scrubbed and washed by the bystanders, and the water employed in these ablutions is hoarded up in bamboo buckets, and carried off to water the fields, the firm belief of the Dyaks being that nothing is so efficacious in producing a good crop as to sprinkle it with water which has touched a white man's skin. But their superstition goes to even greater lengths than this. On one occasion long bamboos filled with rice were brought to some English visitors with the request that they would spit into them. At first they demurred: but at length, fearing that they might be guilty of incivility if they persisted in their refusal, they complied. What was their horror to see the rice instantly emptied out and distributed among the spectators who crowded round and gobbled it up with the greatest avidity, one hideous old hag (who by skilful manœuvring had secured four helps) loudly exclaiming that she had at last secured a sovereign specific against wrinkles, rheumatics, grey hair, and loss of teeth.

The last branch of my subject is the most interesting, though perhaps the least pleasant; for it relates to the great work which Sir James Brooke

carried out among the Dyaks. The good which he did was twofold. In the first place, he redeemed the Dyaks from their oppressed and persecuted condition. Till he obtained the government of Sarawak, the Dyak had been the prey of all his unscrupulous neighbours. He was cheated by traders and plundered by pirates: his wife and children were often taken prisoners and sold into slavery; and all the hostile tribes around them swooped down to murder and to pillage like vultures on the carcase. From the time that Sir James Brooke became governor this state of lawlessness and tyranny ceased: piracy was stamped out, even-handed justice was administered to oppressors and oppressed alike, and the simple-minded Dyak was no longer the prey of the most shameless and most depraved foe. And in the second place, it was through him that the monstrous practice of "head-hunting" came to an end. This head-hunting, which may be shortly described as an organized system of murder and assassination, originated in the feuds between neighbouring tribes. It resembled nothing so much as the thirst for getting scalps among the Red Indians of America, familiar to all readers of the thrilling tales of Mr. Fenimore Cooper and Captain Mayne Reid. The great object of every Dyak was to obtain by fair means or by foul, in open warfare or by secret ambush, the ghastly trophy of a human head. This head-hunting at last became an absolute mania. It was no longer the heads of foemen only which were valued: any head, whether of friend or foe, of man, woman, or child was sought for, till at length even aged parents were not safe from their own children and the graves of the dead were ransacked to obtain these loathsome spoils. And this was not all. Superstition came into play and strengthened the fearful passion. It was believed that the dead could not rest in his grave until those who were nearest of kin to him had cut off a head in his name; and the Dyak belles scorned the weak-minded lover, who could not woo for their affections with the stain of human blood upon his hands.

One story only, at once horrible and ridiculous, I will quote in evidence of this practice. A young man, named Achang, had fallen in love with a Dyak girl who spurned all his advances because he had never taken a head, and so proved himself to be a warrior. Thus pressed by the inexorable demands of his mistress, Achang, with another lad of his own age, set off for the fort, with the object of getting (according to the lady's suggestion) no less a prize than the head of the English governor. They suffered on the way the usual drawbacks of bad birds, bad dreams, and missing the path, so that when they came within sight of the fort to which they were bent, they thought they had better change their plans; and instead of going (as they had originally intended) to take the head of the English governor, they resolved to turn aside into a Chinaman's house under pretext of purchasing his goods and to take his head while he was off his guard. When well cooked and dried, one head (they thought) would do

as well as another, and they would have no difficulty in passing off the Chinaman's head for an Englishman's.

Accordingly they went to a Chinaman's house, had their supper with him very amicably, and then retired to rest, after agreeing that at midnight they would strike the fatal blow. Now it happened that Achang overslept himself, and his friend thought that he might as well take advantage of his drowsiness, and secure the head for himself. Accordingly at midnight hideous yells were heard from the Chinaman's house, and when the people rushed into the room, they found the unfortunate owner with his face gashed all down one side, the Dyak youth having missed his blow in his haste. The actual perpetrator escaped, but Achang was found still fast asleep, and was instantly put in irons.

Next day he was brought down to the chief English station with a chain round his waist. On the way he was followed by a body of Dyaks, who were trying to bribe his keepers to let them take his head. They actually held an auction for his head as they went along, each bidding higher than the other, and the horrors of that twelve-mile march were such that the boy's hair became grey before morning.

After all, Achang was really a most gentle and innocent lad, who was only following the habits of his country in obeying the commands of his lady-love. He was kept in prison for about a month and then set free, after which he attached himself to the service of the white men, and worked in the garden, without showing any tendency to resume his sanguinary tastes.

It was this hideous custom which Sir James Brooke resolved to put down. The Sultan of Kuching, to whose jurisdiction the Dyaks properly belonged, unable to check this increasing madness, resolved to cede the territory to the adventurous Englishman, hoping that where the Sultan's army had failed, his small forces might succeed. This commission Sir James Brooke executed by virtue of that dauntless resolution and unyielding fixity of will which is one of the highest marks of the Anglo-Saxon race. Whenever a party of Dyaks started off on a head-hunting expedition, a force was dispatched after them to cut them off and bring them to justice. On their appearance before the judgment seat of the Governor, they were fined heavily: if they had succeeded in taking heads they were robbed of their trophies and fined still more heavily. If they refused to pay the fine, they were declared to be enemies to the government and their houses were burnt to the ground. For several years the Dyaks were unable to understand the prohibition, and were perpetually coming to the English governor and his officers with requests that they might be allowed to take heads. One old man had just lost a wife, and he really must take a head if only to make her sleep peacefully in her grave. Another young man, who had been jilted by a Dyak maiden, came to beg just for one

head that he might move the heart of the inflexible damsel. A third accepted the general principle that head-hunting was wrong: but there were his next neighbours the Pameerangs,—might he not go and take heads among them? "Because," he pleaded, "they really are such beasts, you know, that they can't be considered as men at all." But the ears of the English ruler were deaf to all entreaties, and the sword of his justice fell with rigid impartiality on high and low, on rich and poor. And as the fines levied on the head-hunting Dyaks were distributed among those who did not hunt for heads, the system had a twofold effect: it proved to the Dyaks that they were not fined for the benefit of the English, and it made the peaceful portion of the Dyaks act as keen-sighted spies on their offending fellow-countrymen.

There can, I suppose, be only one opinion as to the nobleness of Sir James Brooke's efforts and the success which crowned them. He brought peace and friendliness into a land where hate and war were raging: he sacrificed all human interests and human ambition in behalf of men who knew not the country from which he had come, and who could scarce pronounce his name. And the simple-minded savages, who saw that he took nothing for himself, and who, up to that time, had not known what it was to combine the power of a king with the disinterested benevolence of a saint, naturally regarded him with the reverence due to a being of more than earthly mould. In villages where his face had never been seen, inquisitive natives eagerly asked of English strangers, was he not as old as the mountains? could he not bring the dead to life? And they one and all held with unshaken conviction to the belief that it was he who gave them good harvests and made their fruit-trees bear an abundant crop. Other men of this generation have made more stir in the world and their names have flown further on the lips of men; but if we judge of men as we ought to judge them, not by what they *do* but by what they *are*, then the name of Sir James Brooke will stand in the very foremost rank among the noblest benefactors of their fellow men.*

After a few remarks from the Rev. F. W. Farrar, the meeting terminated as there was no time for exhibitions.

There were 70 persons present, 5 Hon. Members, 33 Members, 1 Associate, and 31 Visitors.

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* The author of this paper wishes to express his acknowledgments (as far as the first part of this paper is concerned) to Mr. Wallace's charming book on the "Malay Archipelago."

MEETING HELD OCTOBER 27th, 1871.

The minutes of the previous meeting were read and confirmed.
M. A. CHILTON then read a paper on

ICEBERGS AND ICEFIELDS.

The icy masses which are found floating in the Arctic seas, are of two different descriptions, each of which appears to originate in a different way, these are sheet ice and icebergs. Sheet ice is level, or nearly so, and is only here and there diversified by low hillocks. When such a sheet of ice is so extensive that its limits cannot be discerned from a ship's masthead, it is called a field, and these fields often cover an area of 100 square miles or more. When their limits can be seen they are called floes. Masses of ice up to a quarter a mile in diameter, of various shapes and magnitudes are called drift ice. The other kinds of floating ice mainly consist of icebergs, which project above the surface of the sea like high hills, composed of steep and rugged rocks. Some of these masses are of immense size. Lieutenant Parry measured one aground in Baffin's Bay, in 61 fathoms of water. It was 4,169 yards long, 3,689 yards broad, and 51 feet elevated above the sea. Its weight was calculated to be equal to 1,292,397,678 tons. Captain Graah, the Danish Navigator, examined another on the eastern coast of Greenland, whose circuit at the base he estimated to be 4000 feet, and which rose 120 feet out of the water; he calculated that its contents were more than nine hundred millions of cubic feet. Icebergs differ greatly in shape, the most general form is with one high perpendicular side, the opposite side being very low, and the intermediate surface forming a gradual slope. They usually terminate in acute summits, showing the most fantastic shapes, and an astonishing variety in form and appearance. A few have regular flat sides. Some of them resemble palaces or churches, or old castles with spires, towers, windows, and arched gateways; others pyramids and obelisks, whilst others exhibit a great resemblance to ships, trees, animals, and human beings. They differ in colour according to their age, solidity, or the state of the atmosphere. A very general appearance is that of cliffs of chalk, or of white or grey marble, but a few are of an emerald green colour, while the sun's rays reflected from them sometimes give a glittering appearance to them, so that they look as if made of silver. In the night they are readily distinguished by their natural effulgence, and in foggy weather by a peculiar state of the atmosphere. Their origin has been for a long time a point of controversy, but it is pretty certain that icebergs are nothing more than large fragments of glaciers. A glacier extending

into the sea naturally gets broken off, and large pieces falling into water deep enough to float them get carried down to the open sea, these often bringing down tons of rock and gravel; indeed the Newfoundland banks, as Lieutenant Maury suggests, owe their existence to this cause. Enormous icebergs come down Davis Strait by hundreds, all bearing some burden of rock or gravel. As they drift southward their number is thinned by the increasing heat, but none pass the northern edge of the Gulf Stream, and the great bank is the accumulation of the solid matter thus furnished. Its shape and outline, indeed, correspond with this supposition. This vast submarine plateau is 600 miles long and 200 broad, it lies to the east of Newfoundland, commencing in lat 50°, and as it runs to the south it spreads out and grows larger. Its depth varies from 25 to 95 fathoms, and it stands on a lower platform, the eastern edge of which forms the outer bank. When in Arctic and Antarctic regions a glacier reaches the sea, it breaks off there into large fragments, which float away and are known as icebergs. The geological results effected by icebergs consist in the transport and deposit over the sea bottom of such debris as may have fallen upon the surface of the glacier before it reached the sea, and also in wearing away the submarine rocks or mud over which they may be driven. Icebergs are often seen loaded with rock rubbish and sailing away into mid-ocean with this freight from arctic lands. In the north the cold of winter suffices to freeze the water of the ocean, the first cake of ice formed along shore is soon succeeded by many others, and in a very short time a large expanse of ice is formed. The ice is much to be dreaded, as it often causes shipwrecks. In 1841, a large steam vessel called the "President," left New York for England, but as yet has not been heard of. There is no reasonable doubt but that it has been destroyed, and most people have come to the conclusion that it was crushed between masses of ice. That such an event is far from being beyond the limits of probability may be inferred from what happened in 1821 to the brig "Anne," of Poole. This vessel, on its return from Newfoundland to England, left Greenspond on the 19th of January, and on the evening of the same day it met with several floating islands of ice. On the next morning by sunrise the ship was so completely beset with ice, that no means of escape were visible even from the top of the masts. The ice in its whole extent rose about 114 feet above the surface of the water. It drifted towards the south east and bore the ship along with it for 29 successive days. It was only on the 17th of February that the Captain perceived an opening to the south east, by which he made a successful attempt to disengage the vessel.

In 1841, the year in which the "President" was lost, the Atlantic ocean was more thickly beset with icy masses, and at an earlier season than commonly takes place. This we learn from the report of a steamer called the

"Great Western," which was published in New York. These ice-fields form very soon and very easily when they once begin to freeze, as all separate pieces get frozen together. The struggle is between the sea and the frost (so to speak) to form the first piece of ice, which is borne up with the tide, and, augmented by renewed freezings, becomes at length a shelf stretching for hundreds of miles along the coast, with a breadth of 120 to 130 feet and a height varying from 25 or 30 to 60 or 70 feet. It is known in Greenland as the "Ice-foot." The thaws of summer disengage millions of tons of rubbish, mud, earth, stones, and large blocks of rock from the cliffs above. These are strewn upon the ice-foot. When the summer storms come, large portions of the ice-foot are detached and float out to sea, carrying with them their piles of debris. In time they melt away, and their earthy burden is precipitated to the bottom. By this means the floor of the Arctic seas, in many places, receives annually large quantities of detritus, borne by coast ice from the Greenland shores.

Though the ice-bergs have a more terrible appearance they are less dangerous than the ice-fields. It is generally found that a strong current runs along the side of the iceberg, and by this means a vessel approaching too near is often staved in by being violently dashed against the mass. An account from Captain Scoresby's "Voyage to the Northern Whale Fishery," will give an idea how much these floes are to be dreaded. During a gale, attended by a heavy fall of snow, he had moored his vessel to a floe. About 6 p.m. the snow became so thick that they could scarcely see a hundred yards before them and the wind increased in fury, then two small icebergs were seen approaching the ship, but, as they were not very large ones, their approach was quietly awaited. The first, which was about 36 feet high, struck the ship on the starboard quarter and turned her broadside to the wind, but did not do any serious damage; the second, which approached with much greater velocity, struck the ship on the rudder and slightly bruised her timbers, then grazing the ship's quarter and broadside, it passed forward to the bows, but was fortunately kept from contact by a tongue projecting from its base. Just then, when the ship was so involved with ice that they could not cast off, two floes came in sight, one on the west the other on the south, which, with the floe to which they were moored on the east, completely locked them in. In order to secure themselves, they fastened a large piece of ice ahead of the ship, where the floes threatened the first contact, with the view of being partially defended by it. The first shock of the floes was sustained by the ice with full effect, and for a time afterwards the state of the ship seemed safe. Suddenly the pressure was renewed by some stoppage to the drift of the floes, with tenfold violence. The barrier was squeezed deeply into the floe, and great blocks of ice were broken off and pressed up by the force. While they

were looking at the state of the ship with much anxiety, the berg which had passed them began a revolving and retrograde movement so quick as to overtake them before they could slack astern. It nipped the ship on the larboard beam and bow, against the floe by which they rode. The force was irresistible, it thrust the ship completely upon a broad tongue of the floe, until she was fairly grounded, and began rapidly to force her up the inclined plane formed by the tongue, until the ship had risen eight or ten feet forward and about three abaft. The floe on the starboard side was a mile in diameter and forty feet in thickness with a regular ice wall at its side, upon a tongue of which the ship was grounded. The force exerted upon the ship was awful, two or three sharp cracks were heard at the time the ship was lifted, and a piece of the false keel was torn off. They were threatened with shipwreck for about two hours, when suddenly they were aroused by another sharp squeeze. But, luckily, this very squeeze was the means of freeing them, for it took the ship about the bows, a part rendered prodigiously strong by the arched form of the interior fortifications. It acted like a round body squeezed between the fingers, driving the ship astern, and projecting her clear of all the ice fairly afloat, with a velocity equal to that at her first launching!

Icebergs are not affected by the swell. It has been observed that on approaching an iceberg the thermometer goes down 15 or 20 degrees. When such a change in the atmosphere takes place, the navigator knows how to guard against it.

Now it may be asked in what manner these icy masses which, as it seems, are produced on the shores of Greenland, find their way to the centre of the northern Atlantic, which they can only arrive at by travelling more than twelve hundred miles. A current called "the Polar current" is plainly the cause of this. If this is observed carefully it will be seen why these icy masses are limited to certain parts of the ocean, and are never met with near Europe, nor along the shores of Nova Scotia, New Brunswick, and the United States. This Polar current appears to originate under the immense masses of ice which surround the Arctic pole. Captain Parry found that these masses were continually moving to the S.W., and for this reason he could not reach the Pole by travelling over the ice. Flowing to the S.W., the current runs along the eastern shores of Greenland until it arrives at the narrow sea which divides Iceland from Greenland. It runs with considerable force, and its width certainly is over 100 miles. This explains the fact that most of the fields and floes which block up the sea between Greenland and Spitzbergen get carried to that narrow sea, and that only single masses of small extent are met with to the east of Iceland. To this current it must also be ascribed that the sea between Iceland, Norway, and Scotland is free from ice all the year

round, while the sea which lies to the W.S.W. of Iceland is at times almost choked up with fields, floes, and icebergs. The current sets towards the shores of Greenland above lat. 65°, but below it runs along shore. It is thus that the northern Atlantic is kept free from icebergs: and that the eastern shores of Greenland are so beset by them that all attempts to approach the sea from this side have been a total failure.

When the Polar current gets to Cape Farewell, it turns round it and runs northward into Davis's Strait, then running along the western shore of that strait it gets to Labrador. It proceeds along the Labrador coast in a S.E. direction, and brings down such quantities of ice that, as Captain Graah says, in summer a belt is formed along Cape Farewell, from 120 to 160 miles in width, and so closely is the ice packed that no vessel can enter. These masses are usually found in May, June, and July, never in winter, and rarely at any other time; this is due to the fact that the Polar current does not run all the year round; why is not known; but it is certain that between October and January any vessel can approach those seas in safety. In January the current again begins to run.

The ice of the Antarctic is little known compared with that of the Arctic region. A large perpendicular wall of ice is supposed to exist along the continent in those parts, and a volcano, Mount Erebus, also exists, but, with these exceptions, nothing can be said with certainty about those regions. But the object of this paper is not to treat of any ice except that found in the Arctic seas, therefore we will return to the original subject. The ice is not supposed to exist past a certain line, or degree of latitude, in fact Dr. Peterman, a German geographer, supposed for a long time that after a certain degree of N. lat. there was an open sea unencumbered with ice. A short time ago a paragraph appeared in the *Times* to say that two Lieutenants had actually reached it, by making their way between Spitzbergen and Nova Zembla. It perhaps may be remembered that Kane, the American explorer, got to what he thought was an open sea, but now it seems to be a settled thing that such a sea does exist, and the question is—will it ever be of any practical use? The north-west passage by sea, though an immense quantity of money and time was spent upon it, is still of no use to any one, as it is quite certain that no ship could ever get through the tremendous amount of ice situated there.

Volumes have been written and can still be written about these regions, and the phenomena occurring there. I have not touched on the mirage, nor the ice Blink, nor the splendid Auroras seen there, for want of time and space, but I will now conclude, with the hope that this short account has not been too tedious to you.

After a few remarks on the paper by the President, E. Meyrick passed round a list of notices of Moths, including three new to the School list.

H. J. Verrall exhibited a piece of Roman pavement from the baths of Caracalla, at Rome, and a piece of plaster from the temple of Jupiter at Pompeii, both presented by W. E. Mullins, Esq., also some clay ironstone, before and after smelting, presented by W. Fergus, Esq., M.D.

J. B. Fuller enumerated a brief list of notices of birds.

The President announced the donation of two collections of plants, from the Cambridge Botanical Garden, and Mrs. L. Burd, and exhibited specimens of ginger, nux vomica, gall-nuts from Aleppo, and acorns for tanning, presented by J. H. Beazley, Esq.

C. E. Vaughan announced the donation of two parts of the transactions of the Linnæan Society, by F. E. Hulme, Esq., F.L.S., and of the "Field," by the Common-room.

There were 61 persons present, 2 Honorary Members, 31 Members, 28 Visitors.

MEETING HELD NOVEMBER 3rd, 1871.

The minutes of the previous meeting were read and confirmed.

E. F. im Thurn, Esq., read a paper, illustrated by models and experiments, on *Plant growth*. H. J. Verrall exhibited a specimen of *Spirifer* and of carbonate of Lime, presented by W. E. Mullins, Esq., and a splash of copper from a steel hammer, presented by W. Fergus, Esq., M.D.

J. B. Fuller exhibited a specimen of the Lesser spotted Woodpecker (*Picus minor*) from Weston-super-Mare.

The President exhibited a specimen of the Shag shot at Mildenhall.

Also a fine specimen of fasciculated vegetable marrow; a monstrosity of the common potato presented by Mr. Rowe; and a fresh water sponge from the Cherwell, presented by E. F. im Thurn, Esq. H. J. Verrall exhibited a Japanese tea-pot and ornament formerly belonging to the Tycoon, lent by the Rev. J. Sowerby.

C. E. Vaughan announced the donation of various pamphlets by Professor Newton, F.R.S., J. Britten, Esq., F.L.S. and the Rev. W. Tuckwell.

There were 37 persons present, 2 hon. members, 27 members, and 8 visitors.

MEETING HELD NOVEMBER 10th, 1871.

The minutes of the previous meeting were read and confirmed.

F. P. Lefroy then read a paper on a Visit to the South of Ireland.

There were 50 persons present, 2 Hon. Mem., 27 Members and 21 Visitors.

MEETING HELD NOVEMBER 13th, 1871.

The minutes of the previous meeting were read and confirmed.

The President announced that three members, F. P. Lefroy, P. L. Hesketh and W. J. Gardner had been excluded from the Society, for abuse of the Museum.

W. Fergus, Esq., M.D., then read the following paper on a

A VISIT TO COPENHAGEN AND ITS MUSEUMS.

On Saturday, the 1st of July, we left London by the Earl of Aberdeen steamer for Hamburgh *en route* for Copenhagen. The ship is an old one, too antiquated for the Aberdeen traffic, but good enough for the less pressing merchandise which goes between London and the great North German Emporium. "Slow and Sure" was the epithet bestowed upon her by the Chief Officer who was asked about her qualities. If I had known what "sure" signified in her case I should have eschewed her carefully. It simply meant that she was sure to be behind time, so when we arrived in the Elbe we were just four hours too late for the tide. This was very trying but we managed to reach Hamburgh in a small steamer after the smoothest passage I ever experienced or heard of in the North Sea. Hamburgh has not much to boast of in the way of Architecture or sights. The grand part of the city owes its existence to a dreadful fire that burned one third of the place about 30 years ago. It has been rebuilt in a very handsome manner, the great hollow square round the waters of the Alsterdam being very effective. We made a very short stay at Hamburgh, visiting only the Cathedral, the Zoological gardens and the Exchange, each of which is worthy of notice, but the aquarium in the Zoological gardens claimed the greatest share of our attention. We left the Altona Railway Station about half-past nine for Kiel. Altona and Hamburg are as contiguous as if

they were parts of the same city. Having fared so well on the North Sea we ventured on the longer sea passage that is involved in the Route *via* Kiel and Cörsor. It was midnight when we reached Kiel, but the moon was shining brightly affording a picturesque view of some Prussian Ironclads and the dock-yard works. The steamer was waiting and with small delay we were on our way to Denmark, a cosy supper was spread in the cabin, a calm and welcome sight at any time but especially so after a three hours railway journey. Soon after 5 o'clock on the morning of the 5th of July we set our feet on Danish soil. We had to wait about an hour before the train was due to start, but we found most excellent coffee and delicious bread and butter on our arrival at Cörsor; the train was punctual and we travelled at the rate of about 24 miles an hour. The country is very flat; it is a simple piece of superfluous information which Bradshaw is not apt to afford when he heads the Time table of the West Zealand railway with the announcement "no Tunnels;" he might have added "no bridges or viaducts."

We reached Copenhagen about noon and were glad to find a brilliant sun overhead. There is something quite peculiar to the soft brilliancy of the day-light at Copenhagen, which strikes a visitor at once and is hard to account for. Possibly it may be owing to a degree of reflection from the water which so surrounds and penetrates the city, but, whatever may be the reason, it is certainly the perfection of daylight. There is nothing very remarkable about the people or conveyances; the horses are undersized and the vehicles heavy; the drivers are a well conditioned looking set of fellows, many of them old and grey, but all with a staid cheery look which speaks well wherever it is seen. The Hotel must be noted for its order, its cleanliness, and the thorough super-vision exercised by the landlord. The *Table d'Hote* was at 2 o'clock and always lasted an hour and a half, an almost innumerable variety of dishes, some of them odd to our ideas, being handed round.

Copenhagen has not much to boast of in its buildings. The streets are of a mixed character, and are limited in their extent, from the fact of the whole city being surrounded with water. Many of them are broad and open, others so tortuous and narrow as to be puzzling, yet on the whole it is next to im-possible for any one with his eyes open to lose his way. One great charm of the place is the continual presence of the bright and tideless water which meets you at every turn.

The chief objects of attraction are the Museums. These have not the extent or capacity of our British Museum nor the pretensions of the South Kensington; still they are not only unique in their way but are so arranged as to tell their tale with great clearness. It is one of the first requisites of a Museum that it should be easily comprehensible to ordinary visitors, and I think that these Northern Museums, not only at Copenhagen but also at St.

Petersburgh and Stockholm, are admirably arranged for fulfilling the great design of teaching by example and illustration. The Museums are only open on certain days, and for usually about two hours at a time.

The three Museums of greatest interest are the Ethnographic, that of Northern Antiquities, and Thorwaldsen's.

They are all situated near to each other on one of the Islands, an ancient Palace serving for the location of the two first and of several other Museums.

The scope and design of the Ethnographic Museum has been excellently carried out; the obliging Superintendent accompanied us through most of the rooms and explained the object to be the illustration of the habits and customs of nations chiefly non-Scandinavian; first by the relics that have been found of the antiquities of the now civilized nations, and second by the actual habits and customs of the non-civilized part of the world at the present day.

The visitor is first introduced to the Antiquities, where in excellent order are arranged illustrations of first, the Religious; second, the Domestic; third, the civil life of the various peoples. There are in all about 20 rooms and it is wonderful to see brought together such a vast number of specimens, many of them of a very costly description. Most of the natives are represented the size of life, and the implements are nearly all just as they are in use at the present time, so that for a while we seem to look upon the people at work in their far distant homes. Bushmen, Hottentots and Kaffirs from Africa, Esquimaux of Greenland, Esquimaux of North America, Esquimaux of Asia, are all there; Malays, Dyaks, Andamans, Indians from North and from South America, natives of Siberia and of the Australian Islands and Continents, Chinese, Persians, Turks, and every race of the great continent of India. It is a Museum that might be visited every week for a year and would yet have something novel to examine and classify. The number of people who were present whenever the Museum was open showed the general interest that it excites in the minds of the residents at Copenhagen.

The Museum of Northern Antiquities is much more extensive than the Ethnographic Museum. It is without doubt the most wonderful collection of old world curiosities anywhere to be found. The number of implements of the early and later stone ages is simply enormous. There are whole cases full of splendid specimens, that have been found from time to time, chiefly in Denmark, Sleswig, and Jutland. The Museum was commenced in the year 1807, a year of great distress to Copenhagen and to Denmark generally, the city having in that year suffered the horrors of a three days' bombardment by the English fleet, which inflicted injuries remembered to this day. In that memorable year a patient investigator had been working and collecting materials to work out a theory that he had formed regarding the inhabitants of

ancient Denmark. He and his successor, Mr. C. J. Thomsen, worked to the same purpose, dividing the pre-historic period into three stages—first, the age of unpolished or chipped stone; second, the age of polished stone; and third, the age of bronze. There is a steady advance, not only in the finish but likewise in the variety and extended uses of the implements, as we approach each stage forwards. Instruments of bone are also found amongst those of flint and of bronze. Evidences have been found showing that in these ages human sacrifices were common on solemn occasions, and it is a matter of historical tradition that in times of calamity no rank was exempt from the duty of furnishing victims, but that even the king was sacrificed if necessity seemed to call for it.

The first case in the museum contains a mass of oyster shells mixed with bones of fishes, birds, and mammals, the latter broken to extract the marrow. These are from the famous *Kitchen middens*, found in various parts of Denmark, chiefly in Seeland, and supposed to be the refuse of large congregations of the population, who resorted to the localities for the purpose of fishing. Fragments of rude vessels and flint implements are found amongst the oyster shells. The same kind of oyster is said to be no longer an inhabitant of the Baltic.

The age of Bronze follows the Stone ages. The bronze in general use contains 10 per cent. of tin to 90 per cent. of copper. Gold came into use about the same time for purposes of ornamentation. The use of bronze was restricted because the art of soldering was unknown: the implements and vessels therefore are either cast or beaten out, and the ornamentation is of a set not flowing design.

So far as Denmark is concerned, the use of bronze is evidently of foreign origin, since neither copper nor tin are found in the country. The bronze age is manifestly a grand step beyond the ages of stone and bone implements. Patterns are developed, delicacy of workmanship becomes evident, and the art of decoration and ornamentation is carried on for the adornment of the persons of warriors, and of kings and queens. In this age also are observable different modes of sepulture. In the first bronze age it seems that bodies were buried in rude coffins formed of trunks of trees without the use of a saw, fragments of tissue forming part of the clothing of the deceased are often found in these ancient coffins; a comb of horn, a knife, and a sword of bronze in its wooden scabbard are articles shown as taken from a tumulus of the early bronze period. At a later time burning seems to have been adopted instead of sepulture; with the charred remains have been found some of the most beautiful of the relics of the bronze age.

The Museum is particularly rich in examples of art of this period. A considerable number of ornaments and vessels of gold appear to have been in

use; in one locality eleven thin gold vessels of a basin shape were found enclosed in a large bowl of bronze, with a round cover, which fitted to the bowl by studs. There are knives, rings, scissors, pins, swords, coronets, brooches in great variety, many with ornamental handles, frequently the head of a horse or swan. Amongst the specimens are some of the moulds that were used in casting the bronze. The gold ornaments are frequently of great weight, and interesting both in regard to their value, their workmanship, and the uses to which they were put.

It is generally supposed that the bronze era lasted well into the third century. About the middle of that century a great step was made; iron began to be used, and with it came in not only the use of silver and glass, but also the first glimmering of the use of letters. The most ancient Scandinavian writing is referred to this period, although the use of letters was by no means general till many centuries after. From the beginning of the iron age progress was rapid, boats and ships were built, the horse was in use for riding and for drawing burdens, the arts generally began to flourish. Ornamentation was no longer confined to geometric or regular set figures, but plants, animals, and men, often in fantastic shapes, are met with in the decoration of works of this period. What is very remarkable is that there is no apparent transition state between the bronze and the iron age. Side by side we see the cast bronze sword and the highly Damascened weapon in iron. Although at first sight this may appear to indicate an immigration of a civilized foreign people acquainted with the novel arts, yet it is to be remembered that the whole of Denmark is studded with tombs and monuments where the relics are found so as to indicate that the people who used these implements were fixed in the country.

The remains belonging to the age of iron are deposited in four large rooms which are filled to repletion with the antiquarian treasures that have been disinterred from tumuli, from marshes, from the beds of lakes, and from the sea-shore. The iron age is divided into three epochs, the first extending from the third to the fifth century, the second from the fifth to the eighth century, and the third, the epoch of the Vikings, from the eighth to the beginning of the 11th century when Christianity began to make way in Scandinavia. The remains of the first epoch are most numerous and we find an infinite variety of articles of every description. One thing almost universally observable is that there are few or no perfect specimens to be met with, and it is concluded that they were purposely hacked, bent, and twisted before they were deposited in the tumulus or other place of sepulture.

There can be no doubt that most of the treasures were deposited in the belief that they would in some way or other be enjoyed by their possessors in

the life beyond the grave and many of the articles found in lakes and ditches were thrown in by way of sacrifices to their watery gods.

From a part of Sleswig, formerly covered by the sea, the remains of boats have been obtained, and it has been well made out that it was customary to sink boats in honour of the gods. They were first laden with arms, money, and other articles, fragments of shields, daggers, swords, harness, knives, bows and arrows, the heads of which bear Runic characters, either to show their ownership or as magic spells to ensure victory. Skeletons have been found illustrating the account given by writers of the customs of the ancient Scandinavians. Two skeletons were discovered in Seeland, showing that the victims had been held down under the water by boughs of trees fastened at their ends by long wooden pegs driven deeply into the mud of the marsh. In the Second Epoch of the Iron age an Eastern influence is seen, in most of the relics, especially in those used for ornament and show. Gold is found in greater abundance than at any former period. A labourer working in Bornholm, one of the large islands in the Baltic, discovered a quantity of gold ornaments, weighing 4 Kilogrammes, and of a value of about £360 of our money. Amongst other things were chains of very massive gold rings, these were used before coined money was invented, one or more of the rings being broken off as they were required, most of the remains are on what is known as the Byzantine model, although they are probably of native manufacture, bearing as they mostly do rudely drawn Runic characters.

The third Epoch of the Iron age brings us to the times of the Vikings, and with them comes a change from the Byzantine to what may be called the massive or gigantic style. The ornaments are dragons twisted and contorted in every fashion, but at the same time there is an advance in the workmanship. Considerable quantities of Eastern money and Oriental furnishings of this period, are still found, nearly all of the tombs, in addition to other relics, being found to contain money. The Scandinavians had a great horror of appearing empty-handed in Valhalla of Odin, hence the quantity of relics that are found in their tombs. After the battle of Braavalla, about the middle of the 8th century, Sigurd Ring caused a search to be made for the body of Harald Hildetand, who had fallen in the fray. The body when found, was washed and placed on the war chariots which he had used in the battle and taken into the centre of the tumulus prepared for its reception by Sigurd Ring, his horse was then killed and placed with Ring's own saddle near to the chariot in the tumulus, so that Harald might go to Valhalla either riding or on horseback as he chose. Afterwards Ring made a grand funeral banquet, and commanded all his great men and warriors to throw into the tumulus all their money, their ornaments, and their arms, in honour of the great King Harald. After that, with great care and solemnity the grave was closed with earth. The Vikings not only had

their arms of extraordinary dimensions, but they seem to have clothed themselves in garments of a hideous character, a portion of one of their dresses is preserved ornamented with a pattern of a most grotesque though regular design.

It was very late before the light of Christianity penetrated to the bold and warlike tribes of Scandinavia, and nothing is more remarkable than the quantities of Christian relics of a very early date that are found in this museum. The energetic Vikings, already full of superstitious reverence for their holy things, seem to have furnished the exact soil where a rapid conversion would be likely to take place. The new converts were full of zeal, in many instances too furious in its action, for the propagation and defence of the new faith. When we consider that the third decade of the 11th century is the date of the spread of Christianity in Denmark, it is surprising to find, before the close of the century, tombstones showing acquaintance with the articles of the novel creed. A coped stone is preserved, on one side a man representing the deceased is in the act of shooting an arrow against a centaur, the emblem of evil, while in the distance an angel is seen holding the soul in his bosom, on the other side is a lion with a man's head in its mouth, with obvious reference to the text "The devil as a roaring lion goeth about seeking whom he may devour;" at one end of the stone there is an angel bearing a cross, and at the other end is the sacred monogram. The museum is full of relics relating to the service of the church, altars, carved doors of churches, copes, chasubles, crosses, reliquaries, candlesticks, and other ornaments and vessels, other relics possess an interest from the history attached to their owners, in one case are a number of things that belonged to St. Canute, the patron saint of Denmark, who died in 1106, he was canonized in 1101. Near to these is the famous Dagmar Cross, it is of blue enamel, with gold filagree, the figures of our Lord and the four Evangelists are inserted in a pure white enamel. It belonged to the greatly venerated and much-beloved Dagmar, Queen of Valdemar II, she died in 1212. Another very interesting relic is the first Armstrong gun that was probably ever made. If Sir William Armstrong ever saw this ancient piece of ordnance of the 14th century, he has certainly only improved upon it. It consists of a series of tubes of forged iron, held together by strong iron rings; more than that it is a breech loader and the balls were of stone.

Thorwaldsen's Museum is in a building built expressly for the reception of the works of that great Sculptor. It is an ugly oblong melancholy-looking structure, only relieved at its end by the figure of Victory driving her four steeds. On the outside the walls of the museum are covered with pictures executed in different coloured cements, depicting the various stages in the life of the great sculptor, his early

struggles, his almost despair, his dawning success and steady advancement, ending with his triumphant entry into Copenhagen, are all pourtrayed though in a somewhat rough and not very pleasing manner. I need hardly tell you that this wonderful man was the poor son of a poor Danish artizan, who earned his living by carving figure-heads for ships. The son felt a desire to excel his father, and made sculpture his profession. He left Copenhagen to study at Rome, a poor lad supported for a given number of years by the funds of the Royal Danish Academy. Failure well-nigh overtook him, but fortune smiled, and at last he returned to Copenhagen in a royal frigate, almost waited on by Royalty. We can understand this only after we have seen the results of his labour. It is the one thought that fills a beholder, how could one man's brain elaborate all the powerful, the beautiful, the lovely results by which we find ourselves surrounded in this museum. His whole secret was indomitable perseverance and faith in himself and in his work.

Sculpture is a thing, much more even than painting, to be seen, not talked about. The most perfect command of language is inadequate to convey the impression or give an idea of the feeling that is inspired by the sight of a well-finished piece of sculpture. If I were to give you the names of the most famous of his works it would be like reading a catalogue. We are happily familiar with many of the best of Thorwaldsen's works in plaster and biscuit reproductions, but these, seldom being on the same scale of size, fail to enable us to realize the perfections of the original. The work upon which Thorwaldsen himself placed the highest value was the statues of our Lord and the twelve Apostles. They were a commission from the city of Copenhagen for the embellishment of their great Church of Our Lady, which was rebuilding after its destruction by the English bombardment. The effect in the Church is very fine, but not so striking as the arrangement of the statues in the Hall of Christ in the museum. In the church the figure of the Saviour is placed over the high altar, and an Apostle opposite one of the six pillars on each side of the church, an angel kneels in front of the altar steps holding a large shell serving for a font. The museum contains a specimen of every work executed or designed by Thorwaldsen, a great many of which are necessarily in plaster. There is also a collection of things that belonged to the great artist, preserved with religious care.

In Copenhagen there are other Museums, those of Coins, Engravings, and a wonderful collection of mediæval remains; but the three that I have spoken of have absorbed the whole of the time allotted to such a paper as this by the rules of your Society. I could not help wishing that one could transport a goodly portion of the superfluity of these interesting objects to aid the developement of the Marlborough College Museum, and I think that the

worthy superintendent saw what was in my mind, for near the close of our tour of inspection in the Ethnographic Museum, he quietly observed "Here we receive everything but part with nothing." It was hopeless to expect anything after that, but I made a pilgrimage in search of something to bring home for you, and I was fortunate in being able to procure these veritable specimens of stone implements, which I am pleased to offer for your acceptance. The wedge-shaped stones were supposed to be on the model of Odin's Mallet, with which he vanquished his enemies and established himself as the god of Scandinavia.

Dr. Fergus presented a large case of Flint Implements from Denmark and Sweden, from which a special vote of thanks was passed.

F. E. Hulme, Esq., exhibited a curious old watch, formerly belonging to Algernon Sidney.

E. Meyrick gave his report of Entomological Notices.

The President exhibited a specimen of Cock's-foot Grass (*D. glomerata*), attacked by Ergot, and gave some account of this disease and its effects as a poison; also some specimens of Brambles, showing the peculiar mode of growth of the autumnal shoots.

There were 39 persons present, 2 Hon. Members, 25 Members, and 12 Visitors.

MEETING HELD NOVEMBER 21st, 1871.

This was a private meeting called at the request of J. B. Fuller and other members of the Society, to request the Committee to re-consider their verdict on Lefroy, Hesketh, and Gardner, and to substitute some other punishment except the extreme one of expulsion. It appeared that Lefroy had requested leave from Meyrick to boil his coffee pot in the Museum in the first instance, and this being taken as a precedent, the majority of the Society had more or less broken the rule about the order to be observed in the Museum; but very few also appeared to have paid any attention to the notice given at the beginning of the half-year by the President. Meyrick having confirmed their statement, and the question being put to the vote, the following resolution was carried:—

"That the Committee be requested to reconsider their verdict respecting Lefroy, Hesketh, and Gardner, in consideration of the fact that no wilful disobedience of the Rules was intended."

There were 33 persons present; 2 Hon. Members, 29 Members, 2 Visitors, the two visitors being Lefroy and Hesketh, who were requested to attend as concerned in the matter.

MEETING HELD NOVEMBER 24th, 1871.

The minutes of the previous meeting were read and confirmed.

W. C. Adams read a paper on the Giant's Causeway and its neighbourhood.

The President then exhibited a species of Hermit Crab, presented by L. Calley, Esq.; a Chinese Advertisement, presented by H. W. Thatcher; a specimen of Gutta Percha, as imported, and vegetable Ivory Nuts, presented by N. Whiting; a portion of the rope with which the Vendome Column, was pulled down, presented by E. Millais, and a "Sherborne Farthing for the Poor," presented by W. Fergus, Esq., M.D.

There were 46 persons present, 2 Hon. Members, 28 Members, and 16 Visitors.

The Visitors having retired, the President announced that E. Meyrick had resigned his place on the Committee, and the Treasurership; and proposed H. J. Verrall as a member of the Committee, seconded by A. C. Champneys; he also proposed and A. C. Champneys seconded the following rules:—

That in the event of a vacancy occurring in the Committee, or any other office to which members are elected at the commencement of each half-year, the vacancy be filled up by the Committee.

That the accounts of the Society be managed by the President and Committee, and be audited at least once a half-year by a competent person, who is not a member of the Society.

That in the place of a Treasurer, a Sub-Treasurer be elected to collect all monies due to the Society, under the direction of the Committee.

MEETING HELD NOVEMBER 28th, 1871.

This was a private meeting to consider the following rule proposed by W. C. Adams, and seconded by P. L. Hesketh: "That at any election of officers or determination of rules, all voting shall take place at a private meeting of the Society, and there shall be no voting by proxy."

Another rule had also been proposed by J. B. Fuller, and seconded by R. W. Doyne, but as the Committee considered it an insult to them, it was withdrawn, and apologies signed by Fuller and Doyne, the former at the same time tendering his resignation, which was accepted by the Committee.

After remarks from the President and Mr. Babington, strongly condemning the proposed rule, and alluding to the conduct of certain members of the Society in thus endeavouring to create party feeling and discord, the following members resigned and were ordered to leave the room, F. P. Lefroy, P. L. Hesketh, W. Maud, W. H. Dobie, R. Armitage, and H. C. Tillard.

After some further discussion A. C. Champneys gave notice of his intention of bringing in a rule altering the time of election of the Committee, and was seconded by H. J. Verrall.

After the meeting H. O. Yeatman and W. J. Gardner resigned (also W. C. Adams, the next day.)

There were at the beginning of the meeting 32 persons present, 2 Hon. Members and 30 Members.

MEETING HELD DEC. 1st, 1871.

The minutes of the previous meeting were read and confirmed.

M. A. Chilton then read a paper on Volcanoes, illustrated by Diagrams. A. J. Spencer exhibited an Olive-wood Rosary from Jerusalem; and F. E. Hulme, Esq., F.L.S., a watch formerly belonging to Lord George Gordon.

After the departure of the Visitors; the rules proposed Nov. 24th, were voted for and passed. Also the following one of which due notice had been given:—

"That the election of the officers of the Society take place near the end of the half-year, but that they do not come into office till the beginning of the next half-year."

There were 38 persons present, 2 Hon. Mem., 22 Members and 14 Visitors.

MEETING HELD DECEMBER 8TH, 1871.

The minutes of the previous meeting were read and confirmed.

W. Fergus, Esq., M.D., then read a paper on "Hygiene and Health, especially in relation to food," illustrated by experiments.

There were 47 persons present, 4 Honorary Members, 22 Members, and 21 Visitors.

MEETING HELD DECEMBER 15TH, 1871.

THE minutes of the previous meeting were read and confirmed.

The President then read a paper, written by Rev. J. Sowerby, on "A Walking Tour through the Bregenzer Wald."

The President then exhibited two Indian coins presented by M. H. Smith, Esq., and some Tin sand from Australia, and Teel Seed from India, presented by Rev. J. F. Bright.

The following elections were made :—

Committee—A. Babington, Esq., C. E. Vaughan, F. J. H. Jenkinson.

Librarian and Curator—M. A. Chilton.

Sub-Treasurer—R. W. Doyne.

There were 26 persons present, 1 Hon. Mem., 17 Members, and 8 Visitors.

ENTOMOLOGICAL NOTICES.

The following List of Entomological Notices is by far the largest we have ever had, though but few workers have been found to aid in its perfection. The length of the list is no doubt owing to the residence of the Head of the Section near Marlborough during the holidays, though the thanks of the Society are due to him for a great deal of work done during the half-year.

The resignation of several members quite upset the Ornithological Section, and the Committee regret that no list of observations will appear in the Report.

The Botanical work has been progressing, and one or two plants have been added to the list, but the table of notices has taken up so much room that the report for the half-year must be included in that for Midsummer, 1872.

Names of those whose initials occur in the following List:—

H.B.J.B.	H. B. Jones Bateman.
F.J.H.J.	F. J. H. Jenkinson.
F.P.L.	F. P. Lefroy.
E.M.	E. Meyrick.
W.F.R.	W. F. Rogers.
C.A.S.	C. A. Sladen.
E.W.S.	E. W. Swetenham.

Those marked † are new to the list.

		DATE. CAPTOR.
Gonepteryx Rhamni ...	Brimstone	July 27, E.M.
Arge Galathea	Marbled White	Aug. 3, E.M.
Hipparchia Semele... ...	Grayling	Aug. 14, C.A.S.
H. Tithonus	Large Heath	July 14, E.M.
H. Hyperanthus	Ringlet	July 7, E.M.
†Limenitis Sibilla... ...	White Admiral	July 29, E.M.
Vanessa Atalanta	Red Admiral	Aug. 8, E.M.
V. Io	Peacock	Aug. 6, E.M.
V. Polychloros	Large Tortoiseshell ...	July 17 (bred), E.M.
Argynnis Paphia	Silver-washed Fritillary	July 7, E.M.
A. Adippe	High-brown Fritillary ...	July 7, E.M.

A. Aglaia	Dark-green Fritillary ...	July 7, E.M.
Thecla Quercus	Purple Hairstreak... ...	July 16, E.M.
Polyommatus Argiolus...	Holly Blue	Aug. 7, E.M.
P. Corydon	Chalk-hill Blue	July 20, E.M.
P. Agestis	Brown Argus	Aug. 3, E.M.
Pamphila Linea	Small Skipper	July 7, E.M.
Procris Statices	Green Forester	(by) July 7, E.M.
Anthrocera Filipendulæ	Common Burnet	July 7, E.M.
Smerinthus Tiliæ	Lime Hawk	larva, Aug.31, H.B.J.B.
Sphinx Ligustri	Privet Hawk	July 19, E.M.
†Trochilium Tipuliforme	Currant Clearwing... ...	July 9, E.M.
Hepialus Hectus	Golden Swift	July 5, E.M.
Diloba Cæruleocephala ...	Figure of 8	Sept. 20, (bred), E.M.
Pygæra Bucephala ...	Buff-tip	(larva) Aug. 29, E.M.
†Psilura Monacha... ...	Black Arches...	Aug. 12, E.M.
Dasychira Pudibunda ...	Pale Tussock	(larva) Sept. 18, E.M.
Demas Coryli	Nut-tree Tussock	(larva) Sept. 7, F.P.L.
Orgyia Antiqua	Vapourer...	(larva) July 28, E.M.
		Sept. 9, F.J.H.J.
†Stilpnotia Salicis ...	Satin	July 18, (bred), E.M.
Porthesia Auriflua... ...	Gold-tail	July 15, E.M.
Miltochrista Miniata ...	... ...	Aug. 7, E.M.
†Lithosia Stramineola ...	... ...	July 31, E.M.
L. Complanula	Common Footman	July 15, E.M.
†L. Griseola	... ...	July 31, E.M.
Lasiocampa Quercus ...	Oak Eggar	July 20, E.M.
Trichiura Crataegi	... ...	Sept. 16, E.M.
Pœcilocampa Populi ...	... ...	Dec. 12, E.M.
Gastropacha Quercifolia	Lappet	July 18, E.M.
Cilix Spinula	Chinese Character... ...	Aug. 1, E.M.
†Cymatophora Duplaris	... ...	July 21, E.M.
Bryophila Perla	Marbled Beauty	July 26, E.M.
Acronycta Psi	Common Dagger	June 30, E.M.
†A. Aceris	... ...	June 29, E.M.
		larva, Sept. 7, W.F.R.
†A. Ligustri	... ...	(larva) Sept.19, F.J.H.J.
†Leucania Conigera ...	... ...	Aug. 7, E.M.
L. Lithargyria	... ...	July 20, E.M.
L. Impura	... ...	July 19, E.M.
L. Pallens	Common Wainscot... ...	July 4, E.M.
Gortyna Flavago	... ...	Oct. 20, E.M.

Hydræcia Micacea... ... ... Sept. 19, E.M.
Xylophasia Lithoxylea ... Light Arches ... ... June 29, E.M.
X. Polyodon ... ... (late) Sept.26, F.J.H.J.
† X. Hepatica... ... ... July 3, E.M.
Heliophobus Popularis ... Feathered Gothic ... ... Aug. 27, F.J.H.J.
Luperina Testacea... ... ... Aug. 16, E.M.
† L. Cespitis ... ... Sept. 10, E.M.
Apamea Oculea ... ... Common Rustic ... ... July 20, E.M.
Miana Strigilis ... ... July 4, E.M.
† Caradrina Alsines ... ... July 24, E.M.
† C. Blanda ... ... July 24, E.M.
C. Cubicularis ... ... Aug. 5, E.M.
Agrotis Suffusa ... ... Sept. 29, E.M.
Triphæna Ianthina ... ... (by) Sept. 1, E.M.
T. Fimbria ... ... Broad-bordered Yellow Underwing, Aug. 7, E.M.
T. Orbona ... ... July 27, E.M.
† Noctua Depuncta ... ... Aug. 22, E.M.
N. C.-nigrum ... ... Aug. 21, E.M.
† N. Rhomboidea ... ... Aug. 22, E.M.
N. Festiva ... ... July 15, E.M.
† N. Bella ... ... Aug. 21, E.M.
† N. Baja... ... ... Aug. 9, E.M.
N. Xanthographa ... ... Aug. 13, E.M.
† Orthosia Macilenta ... ... Sept. 21, (bred) E.M.
† O. Lota ... ... Oct. 5, E.M.
Anchocelis Lunosa... ... ... Sept. 8, F.J.H.J.
A. Litura... ... ... Sept. 19, E.M.
A. Pistacina ... ... Sept. 29, E.M.
† Xanthia Cerago ... ... Sept. 14, F.J.H.J.
X. Flavago ... ... Sept. 19, E.M.
X. Ferruginea... ... ... Sept. 9, F.J.H.J.
Cosmia Trapezina ... ... Aug. 1, (bred) E.M.
C. Diffinis ... ... Aug. 16, E.M.
C. Affinis .. .. Aug. 22, E.M.
Phlogophora Meticulosa Angle-shades ... ... July 3, E.M.
Agriopis Aprilina ... ... Sept. 29, E.M.
† Hadena Protea ... ... Sept. 9, F.J.H.J.
H. Oleracea ... ... July 23, E.M.
† Xylina Rhizolitha ... ... Oct. 18, E.M.
Abrostola Urticæ ... ... Light Spectacle ... ... Aug. 18, E.M.
Plusia Chrysitis ... ... Burnished Brass ... ... July 24, E.M.

P. Gamma	... ...	July 7, E.M.
Gonoptera Libatrix ...	Herald	July 28, E.M.
Amphipyra Pyramidea...	Copper Underwing ...	Aug. 10, E.M.
A. Tragopogonis	Mouse	Aug. 18, E.M.
Mania Typica...	... ...	July 19, E.M.
M. Maura	Old Lady	July 8, E.M.
Catocala Nupta	Red Underwing	Aug. 24, C.A.S.
Ourapteryx Sambucaria	Swallow-tailed	July 1, E.M.
Epione Apiciaria	... ...	Sept. 2, F.J.H.J.
Rumia Cratægata	Brimstone	Aug. 15, E.M.
Angerona Prunaria ...	Orange	July 8, E.M.
Metrocampa Margaritata	Light Emerald	July 1, E.M.
† Ellopia Fasciaria... ...	Barred Red	July 26, E.M.
Pericallia Syringaria ...	Lilac Beauty	July 20, E.M.
Selenia Illunaria	Early Thorn	July 15, E.M.
Odontopera Bidentata ...	Scolloped Hazel	(larva) Sept. 20, E.M.
Crocallis Elinguaria ...	Scolloped Oak...	July 22, E.M.
Ennomos Tiliaria	Canary-shouldered Thorn	Aug. 21, E.M.
† E. Fuscantaria	... ...	Sept. 3, E.W.S.
E. Erosaria	... ...	Sept. 21, E.M.
E. Angularia	... ...	Aug. 4, E.M.
Cleora Lichenaria	... ...	June 30, E.M.
Boarmia Rhomboidaria...	Willow Beauty	July 20, E.M.
† Pseudoterpna Cytisaria	Grass Emerald	Aug. 10, E.M.
Hemithea Thymiaria ...	... ...	July 20, E.M.
Ephyra Trilinearia... ...	... ...	July 1, E.M.
Asthena Luteata	Small Yellow Wave ...	June 29, E.M.
Acidalia Scutulata ...	... ...	July 26, E.M.
A. Bisetata	Small Fan-footed Wave	July 3, E.M.
A. Virgularia...	Small Dusty Wave ...	June 29, E.M.
A. Imitaria	Small Blood-Vein	July 23, E.M.
Bradyepetes Amataria ...	Blood-Vein	July 6, E.M.
Halia Wavaria	V. Moth	July 15, E.M.
Strenia Clathrata	Latticed Heath	Aug. 7, E.M.
Abraxas Grossulariata ...	Magpie	July 7, E.M.
Cheimatobia Brumata ...	... ...	Nov. 8, F.J.H.J.
Oporabia Dilutata	... ...	Oct. 10, E.M.
Larentia Didymata ...	Twin-spot Carpet	June 29, E.M.
† Eupithecia Subnotata	... ...	July 8, E.M.
† E. Assimilata	... ...	Aug. 16, E.M.
E. Exiguata	... ...	June 30, E.M.

† Lobophora Viretata ...	... ...	Aug. 10, E.M.
Ypsipetes Elutata	July Highflyer	July 17, E.M.
Melanthia Ocellata ...	Purple-bar Carpet	Aug. 7, E.M.
† M. Albicillata	... ...	July 5, E.M.
Melanippe Unangulata ...	... ...	July 15, E.M.
M. Rivata	Wood Carpet	July 13, E.M.
Coremia Ferrugaria ...	... ...	Aug. 6, E.M.
C. Unidentaria	... ...	Aug. 2, E.M.
Camptogramma Bilineata	Yellow Shell	June 29, E.M.
† Phibalapteryx Tersata	... ...	July 1, E.M.
† P. Vitalbata	... ...	Aug. 16, E.M.
Scotosia Dubitata	Tissue	Aug. 6, E.M.
Cidaria Miata...	Autumn Green Carpet ...	Sept. 18, E.M.
C. Picata...	... ...	July 7, E.M.
C. Russata	Marble Carpet	Aug. 7, E.M.
C. Immanata	... ...	July 2, E.M.
C. Prunata	... ...	July 20, E.M.
C. Fulvata	... ...	July 7, E.M.
C. Pyraliata	Barred Straw	June 30, E.M.
Eubolia Mensuraria ...	... ...	July 22, E.M.
† E. Cervinata	... ...	Oct. 12, E.M.
Anaitis Plagiaria	Treble Bar	Sept. 19, E.M.
† Chesias Spartiata ...	... ...	Oct. 17, E.M.
Hypena Proboscidalis ...	Snout	June 30, E.M.
† Rivula Sericealis ...	... ...	July 6, E.M.
Agloœa Pinguinalis ...	Tabby	July 1, E.M.
Pyrausta Ostrinalis ...	... ...	Aug. 11, E.M.
Hydrocampa Nymphæata	Brown China Mark ...	(by) Sept. 9, F.J.H.J.
H. Stagnata	Beautiful China Mark ...	July 14, E.M.
Botys Verticalis	Mother of Pearl	June 30, E.M.
B. Urticata	Small Magpie...	July 3, E.M.
Pionea Forficalis	Garden Pebble...	Aug. 9, E.M.
Scopula Lutealis	... ...	Aug. 7, E.M.
Simaethis Fabricana ...	Nettle Tap	(by) Sept. 20, E.M.
† Eudorea Frequentella	... ...	July 13, E.M.
Aphomia Colonella ...	... ...	Aug. 9, E.M.
Crambus Tristellus ...	... ...	Sept. 17, E.M.
† Chloephora Quercana	... ...	July 14, (bred). E.M.
C. Prasinana	... ...	(larva) Sept.9, F.J.H.J.
Alucita Polydactyla ...	Twenty Plume	Aug. 9, E.M.

DONATIONS TO THE MUSEUM.

Archæology.—

Portion of one of the Irish Round Towers, presented by H. R. Armstrong.

A magnificent case of Danish Celts, by W. Fergus, Esq., M.D.

Old M.S.S. relating to Marlborough, by Mr. Neate.

Coins by R. Armitage, Mr. Phelps, W. Fergus, Esq., M.D., and M. H. Smith, Esq.

Portion of Pavement of the Alhambra, by H. O. Yeatman.

Piece of Roman Pavement from bath of Caracalla at Rome, and of plaster from the Temple of Jupiter at Pompeii. } by W. E. Mullins.

Botany.—

Baskets of Ferns for the Garden, by J. B. Oakeley, and F. P. Lefroy.

Specimen of *Impatiens fulva* by H. A. Evans, Esq.

Specimen of *Cynodon Dactylon*, a grass from Studland, near Wareham, by J. H. Garland.

Teel Seed from India, by Rev. J. F. Bright.

Collection of Chinese Plants, by C. W. Everard, Esq.

Hampers of Plants for the garden by Mrs. L. Burd, and Professor C.C. Babington, F.R.S.

Gutta Percha as imported and Vegetable Ivory Nuts, by N. Whiting.

Plant of *Ailanthus glandulosa* for the garden, by Mr. W. J. Baverstock.

Collection of Dried Plants, J. Britten, Esq., R.S.

Geology.—

Minerals from Alderney, by Rev. G. W. De Lisle.

Two Specimens of "Gibraltar Rock," by E. A. Ogle.

Pair of fossil *Pholas* from Whitby, by Rev. G. W. De Lisle.

Copper Ore, &c., from Coombe Martin, by F. W. Toms.

Echinus from Epsom, by S. J. Soady.

Tin Sand from Australia, by Rev. J. F. Bright.

A very fine series of Chalk fossils and flints, by Rev. J. F. Bright.

A large collection of Fossil bones, by Rev. J. F. Bright.

Fossils by H. O. Yeatman.

Clay Iron stone before and after Smelting, by W. Fergus, Esq., M.D.

Specimen of *Spirifer* and carbonate of Lime, by W. E. Mullins, Esq.

Splash of Copper from Steel Hammer, by W. Fergus, Esq., M.D.

Entomology.—

29 Preserved Larvæ of Butterflies and Moths, by Rev. F. W. Farrar, F.R.S.

Variety of Chalk-hill blue Butterfly, (*P. Corydon*), by C. A. Sladen, Esq.

Small Pendent Wasp's nest, by F. Storr, Esq.

Ornithology.—

Eggs of Shrike and Bull-bull from India, by R. H. Dyball.

Several rare Birds, Tengmalm's Owl, Blue-throated Warbler, &c., by E. im Thurn, Esq.

Miscellaneous.—

Large Shark, stuffed, by E. Hunter.

Large case of "Curiosities," among which were "Sea Eagle," Jaws of "Sea Devil," Shark's Jaws, Horns of Buffalo, &c., &c., by J. H. Beazley, Esq.

Portion of the Shoe of a man struck by Lightning, by G. Nares.

Shells from Thurlstan, Devonshire, by J. E. Square.

Indian Play Bill and Paintings on Rice Paper, by H. C. Spry, Esq.

Chinese Advertisement, by H. W. Thatcher.

Hungarian Play Bill, by W. A. Eckersley.

Portion of rope used for pulling down the Vendome Column, by E. Millais.

Indian Mocassins, by Rev. F. W. Farrar, F.R.S.

Species of Hermit Crab, by L. Calley, Esq.

Library.—

Proceedings and Transactions of the New Zealand Institute, Vol 3, by The Society.

Transactions of the Norfolk and Norwich Naturalists' Society, by H. C. Spry, Esq.

Journal of the Linnean Society, by F. E. Hulme, Esq.

Journal and Proceedings of various Societies, by J. Britten, Esq., F.L.S.

Report on a Cave at Settle, by J. E. Pierson.

Waterton's "Essays on Natural History," H. A. Evans, Esq.

"Dictionary of Science," by G. F. Rodwell, Esq., F.C.S., &c.

Paper on the "Formation of Cirques" by Rev. T. G. Bonney, Esq., F.G.S.

Paper on "Observation" by Professor Newton, F.R.S.

Eight volumes of works on Natural History, by H. C. Spry, Esq.

"The Field," by The Common Room.

Science Gossip and Popular Science Review, by Rev. F. W. Fuller.

Paper on the difficulties of teaching science at Public Schools } Rev. W. Tuckwell.

DONATIONS TO THE FUNDS OF THE SOCIETY.

	£	s.	d.
Rev. F. W. Farrar	5	0	0
R. Hunter, Esq.	1	1	0
C. E. Vaughan	0	2	6
E. F. im Thurn, Esq....	0	5	0
F. J. H. Jenkinson	0	1	0
D. E. Leighton, Esq.	0	7	6
Rev. T. A. Preston	1	0	0
	£7	17	0

TOWARDS GARDEN EXPENSES.

	£	s.	d.
G. F. Rodwell, Esq.	0	15	0
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R. Armitage	0	2	6
J. F. Thomas	0	2	6
F. P. Lefroy	0	2	6
W. J. Gardner	0	2	6
	£5	10	0

ACCOUNTS.

Receipts.	£	s.	d.	Expenditure.	£	s.	d.
Balance in hand	28	14	4	Plates for Report for Mids.	1	18	6
Honorary Members	3	7	6	Library Expenses	3	13	10
Compositions	7	4	6	Museum	8	15	6
Members	4	11	0	Field Day	4	18	6
Associates	0	9	0	Conversazione	9	7	7
Field Day	2	9	6	Stationery...	1	4	2
Arrears	0	13	0	Plates for Report for Christmas, 1871	1	5	3
Donations	18	7	0	Printing Account	24	4	3
Sundries	0	12	7	Garden Expenses	38	1	10
Sale of Reports	35	5	0				
Sale of Antiquities	1	5	0				
To be received for Tiles ...	5	0	0	Balance	9	9	0
	£102	18	5		£102	18	5

ACCOUNT OF REPORTS.

Number Printed	400
Given away	93
Sold	282
In hand	25
	400

BOTANY.

In order not to delay the publication of the Report, the following Table of the average dates of flowering of about 300 plants (cultivated and wild) has been drawn up in the form of a Calendar. It is intended to publish shortly a more detailed list, showing what influence (if any) temperature and rain have had in causing the variation of the time of first flowering. Only those plants are mentioned of which five observations at least have been taken. The *amplitude, i.e.*, the limits between which the first flowers have been observed, is very remarkable—some may appear to be impossible, and to indicate errors in observation, but as all dates and species are omitted about which any reasonable doubt existed, the list may be considered as fairly accurate. Still errors must have crept in and I shall feel greatly obliged to those who will point out any such to me. It may also be mentioned that some of the most extraordinary dates are certainly correct, as records exist of the plants being *in bud* from time to time up to the date of flowering recorded. All extra-early specimens are omitted, otherwise the amplitude would have been far greater than is mentioned.

T. A. PRESTON.

FEBRUARY.

		No. of obs.	Earliest	Latest	Amplitude
8.	Snowdrop (*Galanthus nivalis*)	6	Jan 30 '69	Feb 20 '65	21
15.	Ivy-leaved Speedwell (*Veronica hederifolia*)	6	Feb 8 '70	Feb 20 '66	12
17.	Lesser Celandine (*Ranunculus ficaria*) ...	7	Jan 30 '69	Mch 6 '65	35
	Spurge Laurel (*Daphne Laureola*)	5	Feb 11 '70	Feb 25 '67	14
23.	Cornel Cherry (*Cornus mascula*)	5	Feb 18 '69	Mch 6 '70	21
26.	Two-leaved Squill (*Scilla bifolia*)...	5	Feb 11 '69	Mch 21 '65	38
27.	Hairy Bitter-cress (*Cardamine hirsuta*) ...	7	Feb 8 '66	Ap 8 '65	59
	Dog's-mercury (*Mercurialis perennis*)	7	Feb 13 '69	Mch 27 '65	42
	Siberian Squill (*Scilla Sibirica*)	7	Feb 8 '66	Mch 24 '67	44
28.	Colts-foot (*Tussilago Farfara*)	7	Feb 11 '67	Ap 1 '65	49

MARCH.

1.	Barren Strawberry (*Potentilla fragariastrum*)	7	Jan 18 '69	Ap 7 '65	79
4.	Sweet Violet (*Viola odorata*)...	7	Feb 16 '69	Mch 23 '65	35
7.	*Pyrus Japonica*	7	Feb 9 '69	Ap 8 '65	58
	Daffodil (*Narcissus Pseudo-narcissus*)	7	Feb 15 '69	Ap 2 '65	46
8.	Butter-bur (*Petasites vulgaris*)	7	Feb 23 '67	Ap 10 '65	49
	Great Sallow (*Salix caprea*)	7	Feb 16 '69	Ap 1 '65	44
9.	Whitlow-grass (*Draba verna*)	7	Feb 26 '69	Ap 6 '65	39
	Wych Elm (*Ulmus montana*)...	6	Feb 14 '69	Ap 1 '70	46
10.	Green Hellebore (*Helleborus viridis*)	5	Feb 24 '69	Ap 1 '67	36

	No. of obs.	Earliest	Latest	Amplitude
14. Wood Anemone (*Anemone nemorosa*)	7	Feb 27 '69	Ap 6 '65	38
Moschatel (*Adoxa moschatellina*)...	7	Feb 20 '68	Ap 1 '65	40
15. Lungwort (*Pulmonaria officinalis*)	5	Feb 13 '69	Ap 8 '66	54
19. Hairy Violet (*Viola hirta*)	6	Mch 6 '69	Ap 6 '67	31
20. Marsh Marigold (*Caltha palustris*)	7	Mch 5 '69	Ap 13 '65	39
21. Box (*Buxus sempervirens*)	7	Feb 16 '69	Ap 29 '65	72
24. Gooseberry (*Ribes grossularia*)	6	Mch 9 '69	Ap 7 '67	29
White Dead-nettle (*Lamium album*)	5	Mch 3 '68	Ap 13 '65	41
26. Scarlet Ribes (*Ribes sanguineum*)	7	Feb 24 '69	Ap 15 '65	50
Ground Ivy (*Nepeta Glechoma*)	7	Mch 23 '70	Ap 9 '65	26
27. Shepherd's Purse (*Capsella Bursa-pastoris*)	5	Mch 14 '68	Ap 16 '66	33
Larch (*Larix Europœa*)	7	Mch 11 '71	Ap 17 '65	37
30. Sloe (*Prunus spinosa*)	7	Feb 20 '69	Ap 16'65'70	56
31. Yellow Figwort (*Scrophularia vernalis*) ...	5	Mch 18 '68	Ap 17 '70	30
Cowslip (*Primula veris*)...	7	Mch 20 '69	Ap 7 '65	18
APRIL.				
1. Wood Violet (*Viola Riviniana*)	6	Mch 6 '69	Ap 16 '70	41
2. Wood Violet (*Viola Reichenbachiana*) ...	5	Mch 20 '71	Ap 12 '70	23
Bullace (*Prunus insititia*)	7	Feb 27 '69	Ap 21 '65	53
Grape Hyacinth (*Muscari racemosum*)... ...	6	Mch 9 '69	Ap 16 '65	38
Hairy Wood-rush (*Luzula pilosa*)	6	Mch 15 '71	Ap 22 '67	38
3. Goldilocks (*Ranunculus auricomus*)	6	Mch 8 '69	Ap 19 '67	42
Field Pansy (*Viola arvensis*)	7	Mch 24 '71	Ap 17 '66	24
Hornbeam (*Carpinus Betulus*)	6	Mch 16 '69	Ap 21 '70	36
5. Rue-leaved Saxifrage (*Saxifraga tridactylites*)	7	Feb 28 '69	Ap 23 '71	54
6. Crown Imperial (*Fritillaria Imperialis*) ...	6	Mch 9 '69	Ap 17 '65'66	38
7. Red Currant (*Ribes rubrum*)...	7	Mch 22 '68	Ap 17 '70	26
9. Wood Sorrel (*Oxalis Acetosella*)	6	Mch 23 '68	Ap 20 '69	29
Cow Chervil (*Anthriscus sylvestris*)	7	Mch 21 '70	Ap 25 '71	35
10. Cuckoo Flower (*Cardamine pratensis*)... ...	7	Mch 25 '69	Ap 22 '66	28
Toothwort (*Lathræa squamaria*)	7	Mch 30 '66	Ap 26 '70	28
Snake's-head (*Fritillaria meleagris*)	7	Mch 30 '68	Ap 18 '70	19
12. Greater Stitchwort (*Stellaria Holostea*) ...	7	Mch 25 '69	Ap 24 '65	30
Ash (*Fraxinus excelsior*)	7	Mch 23 '69	Ap 28 '67	36
13. Buttercup (*Ranunculus bulbosus*)	7	Mch 30 '69	Ap 24 '65	26
Greater Periwinkle (*Vinca major*)	6	Ap. 2 '71	Ap 23 '65	21
Field Wood-rush (*Luzula campestris*)	7	Ap 2 '69	Ap 30 '66	28
Meadow Fox-tail Grass (*Alopecurus pratensis*)	7	Mch 25 '69	Ap 24 '65	30
14. Wild Tulip (*Tulipa sylvestris*)	6	Mch 30 '68	Ap 27 '65	28

	No. of obs.	Earliest	Latest	Ampli-tude
15. Broad-leaved Mouse-ear (*Cerastium glomeratum*)	7	Mch 29 '67	Ap 26 '65'70	28
16. Water Fennel (*Ranunculus pseudo-fluitans*)	7	Ap 13 '69	Ap 19 '67	6
Golden Ribes (*Ribes aureum*)	7	Ap 2 '68	Ap 26 '67	24
Blue-bell (*Endymion nutans*)	7	Ap 5 '68	Ap 24 '71	19
Corn Horse-tail (*Equisetum arvense*)	7	Mch 30 '71	Ap 26 '67	27
17. Wild Navew (*Brassica campestris*)	6	Ap 4 '68	Ap 21 '65'71	16
Wild Cherry (*Prunus Avium*)	6	Ap 12'68'69	Ap 25 '70	13
Snowflake (*Leucojum Æstivum*)	5	Ap 8 '68	Ap 26 '69	18
18. Corn Salad (*Valerianella Olitoria*)	7	Mch 23 '67	Ap 28 '71	36
Ribwort (*Plantago lanceolata*)	7	Ap 3 '68	Ap 28 '67	25
19. Garlic Hedge-mustard (*Alliaria officinalis*)	7	Ap 12 '69	Ap 26 '65	14
Cuckoo-pint (*Arum maculatum*)	7	Ap 10 '68	Ap 26 '65	16
20. Tuberous Vetch (*Lathyrus macrorrhizus*) ...	7	Ap 13 '68	Ap 29 '69	16
Early Purple Orchis (*Orchis mascula*)	7	Ap 11 '69	Ap 24'65'66	13
22. Early Scorpion-grass (*Myosotis collina*) ...	7	Ap 14 '67	May 1 '68	17
23. Upright Crowfoot (*Ranunculus acris*)	7	Ap 5 '68	May 12 66'	37
Black Medic (*Medicago lupulina*)	7	Ap 18'68'70	May 6 '67	19
Bush Vetch (*Vicia sepium*)	7	Ap 14 '68	May 5 '67	21
Strawberry (*Fragaria vesca*)	7	Ap 4 '68	May 12 '70	38
Field Scorpion-grass (*Myosotis arvensis*) ...	7	Ap 4 '68	May 6 '67	32
24. Dove's-foot (*Geranium molle*)	7	Ap 9 '68	May 1 '67	22
Comfrey (*Symphytum officinale*)	7	Ap 16 '69	Ap 30 '65	14
Germander Speedwell (*Veronica chamædrys*)	7	Ap 17 '70	May 4 '67	17
Archangel (*Lamium galeobdolon*)	7	Ap 10 '68	Ap 30 '66	20
25. Greater Celandine (*Chelidonium majus*) ...	7	Ap 2 '68	May 7 '67	35
Fumitory (*Fumaria officinalis*)	7	Mch 25 '69	May 23 '67	60
Charlock (*Sinapis arvensis*)	7	Mch 25 '69	May 19 '70	55
Three-nerved Sandwort (*Arenaria trinervis*)	7	Ap 14 '68	May 3 '65'67	19
Meadow Saxifrage (*Saxifaga granulata*) ...	7	Ap 20'65'69	May 4 '67	14
Cross-wort (*Galium cruciatum*)	7	Ap 18 '70	May 10 '67	22
Corn Gromwell (*Lithospermum arvense*) ...	6	Ap 6 '71	May 9 67	33
Birch (*Betula glutinosa*)	7	Ap 17'65'67	May 10 '71	23
Great River Sedge (*Carex riparia*)	7	Ap 8 '69	May 14 '70	36
26. Red Campion (*Lychnis diurna*)	7	Ap 16 '65	May 8 '66	22
Ivy-leaved Toad-flax (*Linaria Cymbalaria*)	6	Ap 8 '68	May 9 '65	31
Herb Paris (*Paris quadrifolia*)	6	Ap 12 '71	May 2 '66	20
27. Creeping Crowfoot (*Ranunculus repens*) ...	7	Ap 19 '67	May 8 '65	19
Thyme-leaved Speedwell (*Veronica serpyllifolia*)	7	Ap 9 '68	May 7 '66	28

		No. of obs.	Earliest	Latest	Ampli-tude
	Wood Spurge (*Euphorbia Amygdaloides*) ...	7	Ap 20 '69	May 12 '70	22
	Vernal Grass (*Anthoxanthum odoratum*) ...	7	Ap 20 '69	May 12 '70	22
28.	Milkwort (*Polygala vulgaris*)...	7	Ap 23 '68	May 7 '66	14
	Water Avens (*Geum rivale*)	7	Ap 1 '66	May 18 '70	47
	Crab Apple (*Pyrus Malus*)	5	Ap 16 '71	May 7 '66'67	21
29.	Hairy Rock-cress (*Arabis hirsuta*)	5	Ap 12 '66	May 12 '70	30
	Beg-bean (*Menyanthes trifoliata*)...	5	Ap 19 '69	May 6 '68	17
	Bugle (*Ajuga reptans*)	7	Ap 26'69'70	May 5 '66	9
	Early Sedge (*Carex præcox*)	7	Ap 20 '69	May 13 '70	23
	Meadow-grass (*Poa pratensis*)	7	Ap 19'69'70	May 7 '65'67	18
30.	Shining Crane's-bill (*Geranium lucidum*) ...	7	Ap 26 '69	May 4 '68	8
	Rose-root (*Sedum Rhodiola*)...	6	Ap 15 '71	May 8 '69	23
	Sweet Woodruff (*Asperula odorata*)	7	Ap 15 '68	May 12 '70	27
	River Sedge (*Carex paludosa*)	6	Ap 15 '69	May 14 '70	29

MAY.

1.	Field Maple (*Acer campestre*)	7	Ap 22 '69	May 12 '70	20
	Sycomore (*Acer Pseudo-platanus*)	7	Ap 20 '68	May 12 '70	22
	Horse Chestnut (*Æsculus Hippocastanum*)...	7	Ap 25 '65	May 12 '70	17
	Herb Robert (*Geranium Robertianum*) ...	7	Ap 27'65'69	May 8 '68	11
	Common Avens (*Geum urbanum*)	7	Ap 25'65'71	May 12 '70	17
	Leopard's-bane (*Doronicum Pardalianches*)	7	Ap 22 '69	May 15 '70	23
	Lilac (*Syringa vulgaris*)...	5	Ap 23 '69	May 7 '66	14
	Glaucous Sedge (*Carex glauca*)	7	Ap 20 '69	May 12 '70	22
2.	Clover (*Trifolium pratense*)	7	Ap 24 '69	May 12 '70	18
	Wayfaring Tree (*Viburnum lantana*)	7	Ap 19 '69	May 16 '66	27
	Green-winged Orchis (*Orchis morio*)	7	Ap 20 '69	May 12 '70	22
3.	Salad Burnet (*Poterium sanguisorba*)	7	Ap 25 '68	May 12 '70	17
	Venus' Comb (*Scandix pecten*)	7	Ap 20 '69	May 13 '68	23
	Blue Sherardia (*Sherardia arvensis*)	7	Ap 28 '70	May 15 '67	18
	Wall Speedwell (*Veronica arvensis*)	5	Ap 20 '69	May 19 '70	29
4.	Bitter Winter-cress (*Barbarea vulgaris*) ...	7	Ap 20 '69	May 16 '66	26
	Good King Henry (*Chenopodium Bonus Henricus*)	5	Ap 23 '70	May 17 '71	24
	Lop grass (*Serrafalcus mollis*)	7	Ap 19 '71	May 13 '68	24
	Rye grass (*Lolium perenne*)	7	Ap 25 '71	May 12 '70	17
5.	Lady's Mantle (*Alchemilla vulgaris*)	7	Ap 29 '68	May 12 '70	13
	Cleavers (*Galium Aparine*)	7	Ap 28 '70	May 10 '66	13
	Marsh Valerian (*Valeriana dioica*)	7	Ap 25 '71	May 12 '70	17
	Oak (*Quercus Robur*)	7	Ap 20 '69	May 18 '70	28

	No. of obs.	Earliest	Latest	Amplitude
6. Columbine (*Aquilegia vulgaris*)	6	Ap 28 '69	May 15 '70	18
Bladder-nut (*Staphylea pinnata*)...	6	Ap 25 '69	May 10 '70	15
Red-rattle (*Pedicularis sylvatica*)...	6	Ap 29 '68	May 17 '71	18
Melic grass (*Melica uniflora*)	7	Ap 27 '66	May 21 '70	24
7. Dusky Crane's-bill (*Geranium Phœum*) ...	7	Ap 30 '68	May 12'66'70	13
Tormentil (*Potentilla Tormentilla*)	7	Ap 29 '65	May 15 '70	16
8. Laburnum (*Cytisus Laburnum*)	7	Ap 30 '69	May 18 '70	19
Sibbaldia (*Sibbaldia procumbens*)...	5	Ap 22 '65	May 16 '66	24
Hawthorn (*Cratægus Oxyacantha*)	7	Ap 30 '69	May 14'66'70	14
Honeysuckle (*Lonicera Caprifolium*)	5	Ap 28 '68	May 20 '66	23
Sterile Brome-grass (*Bromus sterilis*)	6	Ap 30 '71	May 13 '68	13
9. Sanicle (*Sanicula europœa*)	7	Ap 29 '69	May 19 '68	20
Lycium barbarum	5	May 7 '71	May 12'69'70	5
Solomon's Seal (*Polygonatum multiflorum*)...	7	Ap 29 '69	May 21 '66	22
Great Rough Sedge (*Carex vulpina*)	6	Ap 22 '69	May 21 '70	29
Millet-grass (*Milium effusum*)	7	May 1 '69	May 18 '70	17
10. Berberry (*Berberis vulgaris*)	5	May 3 '68	May 20 '70	17
Ramsons (*Allium ursinum*)	5	May 2 '71	May 22 '69	20
Wood Sedge (*Carex sylvatica*)	7	Ap 29 '68'69	May 18 '70	19
Cock's-foot Grass (*Dactylis glomerata*) ...	7	Ap 29 '69	May 16 '67	17
Rye...	7	Ap 24 '71	May 22 '69	28
11. Star of Bethlehem (*Ornithogalum umbellatum*)	5	May 7 '66	May 26 '70	19
12. Mountain Ash (*Pyrus aucuparia*)...	6	May 6 '66	May 21 '70	15
13. Round-leaved Crane's bill (*Geranium rotundifolium*)	7	Ap 29 '65	Jun 4'67	37
Bird's-foot (*Lotus corniculatus*)	7	May 1 '69	May 28 '66	27
Holly (*Ilex aquifolium*)	7	May 11'65'67	May 18 '70	7
Changeable Scorpion-grass (*Myosotis versicolor*)	5	May 1 '69	May 25 '65	24
Grey Sedge (*Carex divulsa*)	6	May 3 '68	May 28 '67	25
14. White Campion (*Lychnis vespertina*)	7	May 1 '69	May 28 '66	27
Lesser Trefoil (*Trifolium minus*)	7	May 6'68'69	May 23 '65	17
Pig-nut (*Bunium flexuosum*)	7	May 1 '69	May 23 '67	22
Sheep's Fescue-grass (*Festuca ovina*)	6	May 2 '65	May 21 '69	19
15. Dutch Clover (*Trifolium repens*)	7	May 5 '69	May 23 '66	18
Hairy Tare (*Vicia hirsuta*)	5	May 12'69'71	May 23 '67	11
Downy Oat (*Avena pubescens*)	6	May 7 '71	May 21 '69	14
Rough Meadow-grass (*Poa trivialis*)	6	May 8 '66	May 23 '65	15
16. Wood Crane's-bill (*Geranium sylvaticum*) ...	7	May 9 '68	May 29 '66	20
Common Tare (*Vicia sativa*)...	6	Ap 23 '70	Jun 1 '67	39

		No. of obs.	Earliest	Latest	Ampli-tude
	Hog-weed (*Heracleum Sphondylium*)	7	May 1 '69	Jun 4'66'67	34
	Walnut (*Juglans regia*)	6	May 2 '65	May 22 '70	20
	Tway-blade (*Listera ovata*)	7	May 5 '69	May 24 '65	19
	Black-grass (*Alopecurus agrestis*)...	7	Ap 30 '69	Jun 6 '66	37
	Common Fescue-grass (*Festuca rubra*) ...	6	May 7 '69	Jun 3 '65	27
17.	Horse Radish (*Armoracia rusticana*)	5	Ap 29 '69	Jun 5 '67	37
	Scarlet Clover (*Trifolium incarnatum*) ...	7	May 8 '65	May 30 '67	22
	Corn Fever-few (*Matricaria inodora*)	6	May 4 '71	May 28 '65	24
	Ox-eye (*Chrysanthemum leucanthemum*) ...	7	May 12 '65	May 22 '69	10
	Snake-weed (*Polygonum Bistorta*)	6	May 9 '71	May 26 '65	18
18.	Corn Crowfoot (*Ranunculus arvensis*)... ...	7	May 1 '69	Jun 8 '67	38
	Rock-rose (*Helianthemum vulgare*)	7	May 9 '68	Jun 3 '67	25
	Yellow Pimpernel (*Lysimachia nemorum*) ...	6	May 4 '67	Jun 6 '65	33
	Lamb's-tongue (*Plantago media*)	6	May 7 '69	Jun 4 '66	28
	Sheep's Sorrel (*Rumex Acetosella*)	7	Ap 25 '68	Jun 10 '67	46
	Upright Brome-grass (*Bromus erectus*) ...	6	May 6 '71	May 27 '68	21
19.	Hedge-mustard (*Sisymbrium officinale*) ...	7	May 1 '69	Jun 18 '67	48
	Bog Stitchwort (*Stellaria uliginosa*)	5	May 9 '71	May 28 '70	19
	Cut-leaved Crane's-bill (*Geranium dissectum*)	7	May 11'68'69	May 13 '67	20
	Lady's-fingers (*Anthyllis vulneraria*)	7	May 11 '69	Jun 1 '65	21
	Saint-foin (*Onobrychis sativa*)	7	May 12 '70	May 31 '67	19
	Elder (*Sambucus nigra*)	7	May 3 '69	Jun 2 '66	30
	Mouse-ear Hawkweed (*Heiracium pilosella*)	7	May 6 '69	Jun 8 '67	33
	Brooklime (*Veronica Beccabunga*)...	7	May 9 '71	Jun 6 '66	28
	Small Nettle (*Urtica urens*)	6	May 1 '69	Jun 14 '66	44
20.	Spindle (*Euonymus europæus*)	7	May 13 '69	May 29 '66	16
	Horse-shoe Vetch (*Hippocrepis comosa*) ...	7	May 13'65'68	May 29'66'67	16
	Dewberry (*Rubus cæsius*)	7	May 16 '68	Jun 1 '66	16
	Welted Thistle (*Carduus crispus*)...	7	May 13 '69	May 30 '65	17
	Common Sorrel (*Rumex Acetosa*)...	7	May 12 '68	May 25 '67	13
21.	Ragged Robin (*Lychnis Flos-cuculi*)	6	May 7 '69	May 26'70'71	19
	Fool's Parsley (*Æthusa cynapium*)	5	May 8 '69	Jun 11 '70	34
	Yellow Rattle (*Rhinanthus Crista-galli*) ...	7	May 11 '69	May26'66'67'70	15
22.	Prickly-headed Poppy (*Papaver Argemone*)...	5	May 9 '71	Jun 11 '66	33
	Field Flea-wort (*Senecio campestris*)	5	May 13 '67	May 31 '68	18
	Rough Hawk-bit (*Apargia hispida*)	7	May 12 '71	Jun 2 '67	21
	Common Nettle (*Urtica dioica*)	7	May 15'65'66	June 10 '67	26
23.	Purging Flax (*Linum Catharticum*)	6	May 16 '68	Jun 9 '71	23
	Long-stalked Crane's-bill (*Geranium columbinum*)	5	May 3 '70	Jun 15 '65	43

		No. of obs.	Earliest	Latest	Ampli-tude
	Long-rooted Cat's-ear (*Hypochæris radicata*)	7	May 9 '71	Jun 16 '67	38
	Quaking-grass (*Briza media*)...	7	May 19 '71	Jun 2 '66	14
24.	Slender Tare (*Vicia tetrasperma*)...	6	May 7 '69	Jun 12 '67	36
	Smooth Hawk's-beard (*Crepis virens*)... ...	7	May 12 '70	Jun 8 '66	27
	Hound's-tongue (*Cynoglossum officinale*) ...	7	May 17 '69	Jun 6 '66	20
25.	Raspberry (*Rubus Idæus*)	6	May 18 '68	Jun 4 '66	17
	Parsnep (*Pastinaca Sativa*)	6	May 10 '68	Jun 27 '65	48
	Forget-me-not (*Myosotis palustris*)	5	May 19 '68	June 3 '65	15
26.	Long-headed Poppy (*Papaver dubium*)... ...	6	May23'65'69	May 30 '70	7
	Dwarf Orchis (*Orchis ustulata*)	7	May 17 '69	Jun 2 '72	16
	Soft-grass (*Holcus lanatus*)	7	May 15'69	Jun 18 '71	34
27.	Gout-weed (*Ægopodium podagraria*)	6	May 19 '68	June 5 '67	17
	Guelder Rose (*Viburnum opulus*)...	7	May 16'68	Jun 8 '67	23
	Sow-thistle (*Sonchus asper*)	7	May 16 '68	Jun 7 '67	22
	Cow-wheat (*Melampyrum pratense*)	7	May 19'68	Jun 7 '67	19
	Scarlet Pimpernel (*Anagallis arvensis*) ...	6	Ap 28 '69	Jun 20 '65	53
	Butterfly Orchis (*Habenaria chlorantha*) ...	7	May 17 '71	Jun 11 '66	25
	Yellow Iris (*Iris Pseudacorus*)	7	May 15 '69	Jun 8 '67	24
28.	Meadow Crane's-bill (*Geranium pratense*) ...	7	May 19 '68	Jun 13 '66	23
	Dog Rose (*Rosa canina*)	7	May 22 '65	Jun 9 '66	18
	Bryony (*Bryonia dioica*)	5	May 22 '69	Jun 7 '67	16
	Rough Chervil (*Chærophyllum temulum*) ...	7	May 16 '68	Jun 12 '66	27
	Goat's beard (*Tragopogon minor*)...	7	May 11 '69	Jun 7 '66	27
	Flote-grass (*Glyceria plicata*)	5	May 1 '68	Jun 10 '69	40
29.	Common Poppy (*Papaver Rhœas*)...	7	May 12 '69	Jun 16 '67	35
	Wild Mignonette (*Reseda lutea*)	7	May 17 '71	Jun 9 '66	23
	Deadly night-shade (*Atropa Belladonna*) ...	7	May 21 '68	Jun 9 '66	19
	Curled Dock (*Rumex crispus*)	5	May 16 '68	Jun 16 '67	31
	Floating Fox-tail Grass (*Alopecurus geniculatus*)	6	May 17 '71	Jun 12 '65	26
30.	Water-cress (*Nasturtium officinale*)	7	May 21 '69	Jun 6 '66	16
	Spotted Orchis (*Orchis maculata*)	7	May 20 '68	Jun 11 '67	22
	Oat-grass (*Avena pratensis*)	5	May 20'69'70	Jun 14 '67	25
31.	Meadow Vetchling (*Lathyrus pratensis*) ...	7	May 16 '68	Jun 11 '66	26
	Syringa (*Philadelphus coronarius*)	6	May 16 '69	Jun 8 '66'67	23
	Carrot (*Daucus Carota*)	6	May 12 '69	Jun 16 '67	35
	Musk Thistle (*Carduus nutans*)	5	May 15 '69	Jun 12 '70	28
	Marsh Thistle (*Carduus palustris*)	7	May 22 '70	Jun 15 '67	24
	Wild Thyme (*Thymus serpyllum*)...	6	May 26 '70	Jun 5 '69	10
	Black Bryony (*Tamus communis*)	7	May 21 '68	Jun 13 '67	23

JUNE.

	No. of obs.	Earliest	Latest	Amplitude
1. Grassy Stitchwort (*Stellaria graminea*) ...	6	May 19 '71	Jun 15 '67	27
Bloody Crane's-bill (*Geranium sanguineum*)	7	May 6 '68	Jun 20 '67	45
Dog-wood (*Cornus sanguinea*)	7	May 21 '66	Jun 16 '67	26
Corn Chamomile (*Anthemis arvensis*)	6	May 23 '69	Jun 8 '66	16
Knotted Figwort (*Scrophularia nodosa*) ...	7	May 27 '68	Jun 9 '71	13
Creeping Spike-rush (*Eleocharis palustris*)	5	May 19 '68	Jun 16 '65	28
Flote-grass (*Glyceria fluitans*)	5	May 15 '69	Jun 23 '67	39
2. Bladder Campion (*Silene inflata*)..	7	May 20 '68	Jun 11 '71	22
False-oat (*Arrhenatherum avenaceum*)... ...	7	May 20 '68	Jun 20 '71	31
3. Buckthorn (*Rhamnus catharticus*)	7	May 25 '68	Jun 13 '69	19
Crested Hair-grass (*Kœleria cristata*)	7	May 25 '69	Jun 18 '71	24
Crested Dog's-tail (*Cynosurus cristatus*) ...	7	May 25 '68	Jun 16 '71	22
4. Common Mallow (*Malva sylvestris*)	7	May 27 '70	Jun 19 '66	22
Water Hemlock (*Œnanthe crocata*)	5	May 30 '69	Jun 8 '67	9
Field Scabious (*Knautia arvensis*)	7	May 27 '69	Jun 15 '67	19
Milfoil (*Achillœa Millefolium*)	7	May 21 '70	Jun 21 '66	31
5. *Papaver Lecoqii*	5	May 25 '65	Jun 14 '66	20
Bitter-sweet (*Solanum Dulcamara*)	7	May 23 '65	Jun 18 '71	26
6. Honeysuckle (*Lonicera Periclymenum*) ...	7	May 26 '71	June 15 '67	20
Heath Bedstraw (*Galium saxatile*)	5	May 23 '65	Jun 11'70'71	1
Field Bindweed (*Convolvulus arvensis*) ...	6	May 28 '65	Jun 14 '66	17
Hedge Wound-wort (*Stachys sylvatica*) ...	7	May 31 '68	Jun 14 '67	14
7. Hedge Bedstraw (*Galium Mollugo*)	6	May 28 '70	Jun 15 '66	18
Ragwort (*Senecio Jacobœa*)	6	May 17 '71	Jul 1 '66	45
Yellow Oat-grass (*Trisetum flavescens*) ...	7	Jun 1 '68	Jun 14 '66	13
8. Snow-berry (*Symphoricarpos racemosus*) ...	6	May 17 '68	Jun 26 '66	40
Quinancy-wort (*Asperula cynanchica*)... ...	6	May 19 '71	Jun 23 '66	35
Small Scabious (*Scabiosa Columbaria*) ...	5	May 31 '68	Jun 20 '67	21
Great Knapweed (*Centaurea Scabiosa*) ...	5	Jun 5 '68	Jun 10 '69	5
9. Broad Willow-herb (*Epilobium montanum*)	7	June 1 '68	Jun 16 '71	15
Timothy-grass (*Phleum pratense*)...	6	Jun 1 '71	Jn 14'66'67'70	13
10. Wood Vetch (*Vicia sylvatica*)	6	Jun 3 '68	Jun 21 '66	18
Trailing Dog-rose (*Rosa arvensis*)	6	May 24 '65	Jun 24 '71	31
Fragrant Orchis (*Gymnadenia conopsea*) ...	5	Jun 1 '68	Jun 21 '66	20
Great Reed-grass (*Phalaris arundinacea*) ...	7	Jun 2 '68	Jun 30 '66	28
11. *Rosa tomentosa*...	5	Jun 4 '71	Jun 21 '66	17
Clustered Bell-flower (*Campanula glomerata*)	5	May 23 '69	Jun 25 '65	33
Common Speedwell (*Veronica officinalis*) ...	5	Jun 3 '70	Jun 19 '66	16

	No. of obs.	Earliest	Latest	Ampli-tude
Broad-leaved Dock (*Rumex obtusifolius*) ...	6	Jun 2 '68	Jun 26 '66	24
Hairy Brome-grass (*Bromus asper*)	6	May 21 '69	Jun20'67'71	29
12. Meadow-Rue (*Thalictrum flavum*)	5	Jun 1 '69	Jun 24 '67	23
Wall-pepper (*Sedum acre*)	6	Jun 2 '68	Jun 25 '71	23
Black Knapweed (*Centaurea nigra*)	5	Jun 7 '65	Jun 24 '71	17
Broomrape (*Orobanche minor*)	5	Jun 5 '69	Jun 17 '65	12
13. Wheat	7	Jun 7 '65	Jn 18'67'71	11
15. Meadow-Sweet (*Spiræa Ulmaria*)	6	Jun 2 '68	Jun 25 '71	23
16. Privet (*Ligustrum vulgare*)	6	Jn 12 '65'70	Jun 25 '71	13
17. Tufted Vetch (*Vicia Cracca*)	7	Jun 8 '71	Jun 30 '67	22
Yellow Bedstraw (*Galium verum*)	7	May 26 '71	Jun 30 '66	36
Tufted Hair-grass (*Aira cæspitosa*)	5	Jn 10 '68'69	Jun 30 '66	20
18. Nipplewort (*Lapsana communis*)	7	Jun 4 '69	Jun 28 '66	24
19. Red Bartsia (*Euphrasia odontites*)	6	Jn 13 '68'69	Jun 25'66'70	12

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REPORT

OF THE

MARLBOROUGH COLLEGE

Natural History Society,

FOR THE

HALF-YEAR,

ENDING MIDSUMMER, 1872.

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Quis Deus hanc mundi temperet arte domum."

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D.25.12.83

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PREFACE.

ANOTHER half-year has come to a close, and with this close comes the necessity of writing another preface to the N.H.S. Report. A feeling of despair comes over us as we sit down to our arduous task, and as the momentous question rises before our minds whether the work of the Society during the past half-year deserves more praise or blame, whether any advances have been made towards rectifying any of the radical defects of that work? and whether we have risen nearer to the perfect ideal of a Natural History Society? The defects that we allude to are mainly summed up in one word—want of energy. Now, were anyone to look at our List of Notices in almost any department, and merely see the list of captures or finds, without glancing to catch the name of the capturer, he would undoubtedly pronounce that the work of the Society was in the most satisfactory condition imaginable. If, on the other hand, he were to glance at the names of the capturers, he would discover the truth—most creditable to the individuals concerned, but most discreditable to the Society at large—that in each department there are at most but two working members, that all the other *soi-disants* members of the sections are but sleeping partners, as sleepy during the day as the moths they ought to be catching. Now we maintain that this is shameful. The only satisfactory way in which we can show our gratitude—gratitude which we must surely all feel—to the extra energetic members of the present Society, is by helping, however unworthily, in their efforts. To sit by with folded hands while Meyrick sends round his six pages of notices, is most disgraceful.

However, we must not let our contempt for this business prevent us from returning thanks to the few working members of the Society. Of the different sections the Botanical has, as usual, been chiefly worked by the

President, not unsupported by Mr. Sowerby and Mr. Thompson. We wish that we could see members of the school taking more interest in this most interesting branch of Natural Science. Undoubtedly it is in some ways a more abstruse work than others, and less invigorating than climbing trees for eggs or performing gyrations in pursuit of a *Lunosa*.

Geology has unfortunately quite collapsed during the past half. The less said about it the better.

In Ornithology we have been most ably supported by Townsend and Williams: their energy cannot too much be commended; they have risen early, gone without meals, and put themselves to every sort of inconvenience to further the interests of Ornithology; and that *genuine* Ornithology, not merely the taking of eggs, but observations of the birds themselves, and their habits. But our greatest triumph is undoubtedly to be sought for in Entomology. Meyrick, ably seconded by Jenkinson, has not left a lamp, or a paling, or a tree unexamined in which a moth could possibly, in any stage of its existence, lie hid. The result is that he has got upwards of thirty names of moths that are new to the list of the Society. It may confidently be asserted that never has the Entomological or any other section—we had almost said of any school in England—had such an energetic head.

In Archæology again, unusual interest has been excited by the discovery of human remains at the old monastery or convent at Overton, made by the head of that section.

So much for the practical work of the Society. We must now turn to its efforts on paper. The essay by Fuller on Orchids cannot be said to be very successful, still in some ways it shows considerable powers of observation. As to the papers, more than usual have been written by ordinary members of the Society. On the whole less call has been made upon the honorary members for our fortnightly meetings. What papers too have been written by members of the school seem to us to show a more than usual amount of research or learning.

As to field-days we have not been so fertile in results as might have been wished, owing principally to the backwardness of the season. Still both days

were generally much enjoyed, and all present found quite enough to do to occupy their time. The arrangement about the Museum still continues the same. At length, however, there does seem a distant prospect of some more satisfactory settlement.

One word more—about the composition of the Society. It must be confessed that it would be an advantage if more fellows high in the school would join. Let it, however, be well understood that it is the very last wish of the Society to set itself up in opposition to cricket and other games. We indignantly disclaim any such thought. Of course there are—unfortunately for themselves—fellows in the school who have no taste for cricket; for them the Society gives employment, and considers that it is benefitting the school in so doing; for surely even the most inveterate foe of "beetle-hunting" must acknowledge that to be in the forest for any purpose is superior to lounging on the seats all the afternoon. But we do not wish to take anyone away from games; we only assert that it is possible to combine cricket with the pursuit of Natural History, to a certain extent. Notices occur in this report, and have occurred in previous numbers, secured by eminent members of the eleven. Of course the eleven have more work to do than any other cricketers, therefore, *à fortiori*, ordinary cricketers might, with but small trouble to themselves, and with great profit to their powers of observation, add very considerably to the results of the non-cricketing members of the community; while at the same time they might congratulate themselves on possessing greater catholicity than those members, and supporting two school institutions at the same time.

RULES.

1.—That this Society be called the Marlborough College Natural History Society.

Constitution.

2.—That the Society consist of Members, Honorary Members, and Associates.

Officers.

3.—That the Officers of the Society consist of a President, Secretary, Librarian, Curator, and Sub-Treasurer, to be elected from and by Members of the Society.

Election of Officers.

4.—That those Members of the Committee who are not ex-officio Members, be elected half-yearly, and that the retiring Members be eligible for re-election.

5.—That the same rule apply to the Librarian and Sub-Treasurer.

6.—That each candidate for election give in his name to the President, any time before the day of election.

7.—That all canvassing for votes by a Candidate, or by his friends with his knowledge, shall at once disqualify him for any election that half-year.

8.—That any Member canvassing for votes for a Candidate, or for a new rule, forfeit the right to vote on any occasion during that half-year.

9.—That the election of officers of the Society take place near the end of the half-year, but that they do not come into office till the beginning of the next half-year.

10.—That on the occurrence of any election, each Member of the Committee have double the number of votes of any other Member of the Society.

11.—That in the event of a vacancy occurring in the Committee or any other office to which members are elected at the beginning of each half-year, the vacancy be filled up by the Committee.

12.—That eight Honorary Members have the power of debarring a candidate from standing for any office.

Management.

13.—That the affairs of the Society be conducted by a Committee, consisting of the President, Secretary, and three other Members of the Society, to be elected from and by Members of the Society; three of whom shall form a Quorum.

President.

14.—That in case of an equality of votes, the President shall have a double or casting vote.

15.—That in the absence of the President, the Committee be empowered to request any Member of the Society to take the chair.

Secretary.

16.—That the duties of the Secretary be to keep a list of all the members of the Society, and of all former Members and Benefactors who may wish to receive the Reports of the Society; to summon meetings (when necessary) of the Society; to keep a detailed report of the proceedings, as well as lists of Members and Visitors present at each meeting, and generally to act under the direction of the Committee in all matters connected with the welfare of the Society.

17.—That in the absence of the Secretary from any meeting of the Society, minutes of the proceedings be taken by a member of the Committee, appointed by the President.

Librarian.

18.—That the duties of the Librarian be to keep a catalogue of the Library, with the names of the Donors, and to see that the Library Regulations are carried into effect.

Curator.

19.—That the Curator be responsible for the order of the Museum, and when necessary assist the Secretary in the distribution of the Reports of the Society.

Sub-Treasurer.

20.—That the duties of the Sub-Treasurer be to collect all sums of money due to the Society, under the direction of the Committee.

21.—That the accounts of the Society be managed by the Committee, and be audited at least once a half-year by a competent person, who is not a member of the Society.

Library.

22.—That any Member of the Society be at liberty to consult any of the books belonging to the Society, but that only certain volumes, to be decided on by the Committee, be allowed to be taken from the room.

23.—That if any member wishes to take a volume from the Museum, he shall give his name, and the name of the book, to the Librarian, who shall enter them in the book kept for the purpose.

24.—That every volume so taken out be returned by the end of the quarter, but that no book be kept more than one month.

25.—That if any volume be damaged, such damage shall be reported by the Librarian to the Committee, who shall decide upon any further proceeding in the matter.

Museum.

26.—That any Member of a section, who is not a member of the Society, be allowed access to the Museum at such times as it is open to Members of the Society generally, provided he first obtain leave from the President, which leave shall be renewed every quarter, but may be taken away at any time, if the privileges be abused in any manner.

27.—That the same privileges be extended, under the same conditions, to such other Members of the School who may wish to use the Library and Collections for the purpose of study, provided there be a reasonable excuse for their not belonging to a section.

28.—That in all cases the Museum be used for the study of Natural History alone, and not as an ordinary Reading Room, except on Sundays.

Botanical Garden.

29.—That the Garden be under complete control of the President, or of some person appointed by the President.

30.—That the Garden be open to Members of the Society, at all times, except on Sundays, but not to Visitors.

31.—That any Member on application to the President can have the charge of a bed.

32.—That no plants be put in without special leave from the President.

33.—That Members may keep any plants of their own in such places as the President shall appoint, as long as the ground is not required.

34.—That the Society's flowers may not be picked.

35.—That Members may gather from their own plants, but may not depute others to do so.

Members.

36.—That the election of new Members rest entirely with the Committee.

37.—That every Member pay a half-yearly subscription of 2s. 6d., to be paid at the first meeting of the Society in that half-year.

38.—That if a member be elected at, or after the Quarter, he shall only pay 1s. on Election.

39.—That Members have the right to be present, to state their opinions, and to vote at all general meetings of the Society; to introduce a visitor at all general meetings of the Society; to have personal access to the Museum at all times; and to introduce a visitor at such times, as shall seem fit to the Committee.

Honorary Members.

40.—That Honorary Members have all the privileges of Members, except the power of introducing a member of the School to the meetings of the Society.

41.—That Honorary Members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

42.—That Honorary Members may compound for all future subscriptions by the payment of a sum of two guineas.

Associates.

43.—That Associates be confined to members of the VIth and Upper Vth Forms; that they pay 1s. 6d. a half-year, and be entitled to the use of the Museum, and to attend the meetings of the Society whenever they think fit, but shall not be entitled to vote on any question, to introduce a visitor, or to take books out of the Museum.

Visitors.

44.—That on such occasions when the number of those who wish to be present as visitors at the general meetings of the Society is greater than the number of Members who attend, the President and Committee shall be empowered to admit two or more each, as shall seem fit.

Suspension of Members.

45.—That any Member be liable to be excluded from the Society by the Committee, if, in their opinion, he shall have failed to show sufficient energy in the working of the Society.

Sections.

46.—That sections be formed for the more accurate study of the different branches of Natural History, and that the heads of these sections be chosen by the Committee half-yearly from Members of the Society.

47.—That these sections shall hold meetings as often as shall seem fit to the Heads of the several sections, at which any Members of the school, with the sanction of the Head of that section, may attend.

Meetings.

48.—That ordinary meetings of the Society be held once a fortnight, but that the Secretary be empowered to call extraordinary meetings when necessary.

New Rules.

49.—That any Member of the Society have power to propose any new rule or any alteration in an old one, provided the motion be seconded by another Member.

MEETING HELD FEBRUARY 23rd, 1872.

After a few preliminary observations from the President, who announced the election of Smelt and Toms, F. E. Hulme, Esq., F.L.S., read the following Paper on

SYMBOLISM.

We propose, as you are aware, to devote a short time this evening to the consideration of symbolism. It will often be found to be an advantage to take the word itself which expresses our ideas and to analyse it—dissolving it into its original elements. If, then, we take the word "symbolism" and thus treat it, endeavouring to see what light we can throw upon it by breaking it up into its component parts, we find that it is primarily derived from two Greek words, signifying together and to throw—literally, therefore, a throwing together of ideas—a positive and visible sign which is used to suggest something in itself incapable of representation, as, for instance, truth —a picture language as an aid to faith or a means of instruction to the unlearned—a something which may in itself be trivial and common place, which, nevertheless, by education and association of ideas, stands as a sign and a memorial of something higher. We, therefore, naturally expect to find it largely used in the service of religion, as a means of impressing great truths in a simple language upon the ignorant, as, for instance, in the old legend of the preaching of St. Patrick, where he illustrated the doctrine of the Trinity in Unity to his rude hearers by the familiar demonstration afforded by the trefoil clover growing at their feet, the three equal leaflets combining, as we may see, into one perfect leaf.

In the early history of nations and of creeds, as in the childhood of individuals, there is a peculiar susceptibility to, and attractiveness in, this kind of picture teaching, either in painted or sculptured representations or else in words, as in parables, fables, and proverbs: "A sower went forth to sow, and as he sowed, some fell by the wayside and the fowls of the air devoured it." This employment of symbolic expression, though generally used to illustrate great truths, was often used also to veil them from the profane or the uninitiated; the Egyptian priesthood, for instance, reserved to themselves a symbolic or inner meaning in the rites of their religion; the early Christians thus also employed symbols in the midst of the heathen by

whom they were surrounded; and we also most of us remember reading of the raising of the clans by the fiery cross, so graphically described by Sir Walter Scott in the "Lady of the Lake;" and the mysterious little cakes which were passed from hand to hand throughout India shortly before the outbreak of the great mutiny.

Symbolism may manifest itself in many ways; there may, for instance, be symbolism of action, as when in the Middle Ages the Doge of Venice used to go in state and throw a golden ring into the Adriatic, as a symbol of the union and dominion of the city over the sea; as when, too, the Romans compelled a conquered army to pass beneath a yoke in token of servitude. A very good example, again, will be seen in the solemn burying of the hatchet amongst the North American Indians when peace is restored; and we need hardly say that the rites of the Levitical priesthood, abounding as they did in types and shadows, emblems and symbols, give many illustrations of this. We need only mention the incident of the scape-goat; the story must be so familiar to my audience, that I need not dwell on it nor linger to deduce the inner meaning of the act.

Symbolism may be of language, as in the blessing given to Jacob, "With corn and wine have I sustained him,"—corn, the source of the staff of life, and wine to make glad the heart of man, being selected as symbolising the general material prosperity which the expression was meant to convey; and in the writings of the prophet Isaiah especially we may meet with instances, "And there shall come forth a rod out of the tree of Jesse, and a branch shall grow out of his roots." The poetry of the Moors and Persians abounds in these symbolic phrases; the languages of the Indians of North America and of the New Zealanders are also largely indebted to these allusions for their force. As an example of the highly pictorial character of Moorish poetry, we may here just quote a fragment from the Alhambra, the great Mohammedan fortress-palace of Granada. The Moors made great use of inscriptions in their decoration, (the ornamental forms of the Cufic letters blending very pleasingly with a background of foliated design,) as for example:—"Brightly doth our Sultan, like the full moon, shine in the high regions of the empire. May his praiseworthy deeds for ever last, and his radiant light never tarnish! Thou hast risen in the horizon of empire like the sun in the vault of heaven, mercifully to dissipate the intervening shadows of injustice and oppression. Thou hast secured even the tender branch from harm and the breath of the summer gale, and frightened the very stars in the vault of heaven: for if the planets quiver in their orbs, it is only through dread of thee, and if the branches of the Oriental willow bow down, it is perpetually to be thanking thee."

Symbolism may also be expressed by colour, by number, or by form; and it is in these three modifications that we ordinarily meet with it in art. I

would, however, desire to remind you, before we enter more fully upon a consideration of our subject, that in many cases there can be but little doubt that a meaning beyond what may be legitimately borne has, by ancient, mediæval, and modern enthusiasts, been assigned to the works of their own or of earlier times, and in that case this very legitimate means of imparting instruction and interest suffers at the hands of its too devoted friends. A meaning that will flow naturally from any symbol may be appropriate and beautiful, but where the analogy has to be forced, it may at first sight seem ingenious from its grotesque and fantastic imagery, but it ceases to posses the great charm that belongs to true symbol, simplicity, and may be read a dozen ways by perverted, strained, and pedantic ingenuity, and altogether lost sight of by the great mass of the people. As ancient examples of this desire to force a symbolic meaning upon even the most material things, I would instance the opinion of Clement, one of the early fathers of the Christian Church, who taught (to give one example from his writings, out of many) that the five barley loaves with which our Saviour fed the multitude really meant the five senses; that they were fed, not in a material sense at all, but spiritually through the medium of their eyes, their ears, &c.; while Cyril, another early writer, equally disregarding the plain letter of the narrative, taught that these five barley loaves were the five books of Moses. The writings of Cyril abound with this subordination of the literal and historic to a desire to see allegorical and mystical meanings. This same desire, grotesque and ill-advised as it must seem to us, has in all ages of the world made its appearance from time to time. True symbolism consists in the adoption of a certain thing to express as legibly as may be a certain meaning, to recall a certain something to the mind, to be a memorial of something higher than itself. All art work is noble, so far as it gives cause for thought; the thoughts evolved from one work of art may be intrinsically nobler than those from another as a question of degree; but the principle will, I think you will agree with me, hold good, that all work, literary or artistic, is good only in proportion as it supplies food for reflection, and that any art which is æsthetic merely, prettiness for its own sake as the aim and end, must give place to the higher art through which an inner current of meaning may be traced. Turning our consideration now however to such examples of our subject as may be accessible to my hearers, by the study of stained glass, old illuminations, the pictures in our National Gallery, and other public collections, we will first enter upon the investigation of the use of colour in a symbolic sense. A given colour may, however, be used in a good or bad sense, according to the subject represented; we cannot, therefore assign any positive meaning to it, unless we also take into consideration the circumstances under which we meet with it. Thus, in old Gothic work golden yellow signified love and wisdom; the

Moors by golden yellow understood wise and good council, by pale yellow deceit and treason. In France during the reign of Francis I., A.D. 1515, the doors of traitors and felons were daubed yellow. In Spain, the dresses of the State executioners were red and yellow—yellow to indicate the treason, and red its punishment. Judas, thief and traitor, in old glass painting and illumination is generally known by his soiled yellow robes; and at the establishment of the Inquisition under Ferdinand and Isabella, the victims were brought out to die, clad in long coarse woollen robes, dyed yellow, and stamped over in red with crosses and waving flames. White has in every age been accepted as the symbol of purity, holiness, and innocence. In Egypt, the great divinity, Osiris, the judge of the living and the dead, wore a white coronet, and the priests, when engaged in his service, wore robes of white. In Greece, the priests of Jupiter were robed in white; so too the Vestal virgins, the Brahmins of India, and the Druids of our own early history; and in the Bible we read many passages that confirm and carry forward the same idea—the sins that are as scarlet that shall be made white as the snow, and the great army that no man can number, of every people and tongue and nation, standing before the eternal throne and clothed in spotless white. In Roman Catholic countries, the little delicate snowdrop as a symbol of purity is employed to deck the altars of the Virgin. Red signified in the spiritual virtues ardent love; in mundane virtues, courage and energy; in an evil sense, cruelty. In China red is consecrated to religion. Green, hope, abundance; black, sadness or sin; hence in some old MSS., our Saviour during the temptation in the barren wilderness is clothed in a black robe; the expression "prince of darkness," as applied to the arch-tempter, also rises to our minds. White and black used together signified purity of life and humiliation, and were in this sense adopted by the Dominican and Carmelite monkish orders.

A good deal of the peculiar sameness which is so striking in looking through any large collection of Egyptian antiquities (as that in the British Museum) is caused by the fixed rules under which the artist or sculptor worked, each god having not merely a set form and series of attributes with appropriate symbols, but even a fixed arrangement of colours employed in all representations of him. This gives Egyptian work that marked individuality of character as compared with all other styles of art; as the laws of the priesthood once established were immutable, and death was the swift penalty following any attempts at innovation; thus the human figure or that of any divinity was always represented in profile, never in front view; while perhaps a still more curious example of the rigidity of the rules in which the artist was fettered is seen in the fact that in the hundreds of thousands of figures sculptured or depicted in a standing or walking attitude, the left leg is invariably placed in advance of the right; no statue has ever been found where this rule

is reversed; the line you see here is a very thin one which divides orthodoxy from flat heresy. This remarkable conservatism was maintained even long after Egypt after many centuries of independent power had sank into a Roman province, and the same adherence to rule was to be seen that had been in force from the very earliest times. Plato, in speaking of this peculiarity of Egyptian art, says:—"The pictures and statues made 10,000 years ago are in no particular better or worse than those they now make."

Examples of symbolism of numbers are not so frequently to be met with, or, if so, do not so clearly carry their meaning. The figure three, such as a three-pointed window, a trefoil, or triangle symbolised the Trinity; four, the evangelists; six, the attributes of Deity—power, majesty, love, wisdom, mercy, justice—hence the common use of the hexagon, a six-sided figure, in early work; eight, regeneration—the greater number of the old fonts and baptisteries are on this account octagonal; twelve, the apostles, hence applied in a more extended meaning to the Church generally. Seven has by old writers been called the number of perfection, and it is curious to notice how often this idea seems involved in its use. Thus, to quote a few examples, out of many, Balaam, as an effectual test of the will of God, built seven altars and prepared seven oxen and seven rams; Job, referring to the effectual protection of Providence, says: "In seven troubles there shall no evil touch thee," "Wisdom hath hewn her seven pillars;" Jacob, as a sign of perfect submission, bowed himself seven times before his brother. The sevenfold circuit of Jericho prior to its complete overthrow, is another example; Naaman was commanded to bathe seven times in the Jordan; Samson for full security was bound with seven bands; the Jewish Church has seven great holydays in each year; the Romish Church has seven Sacraments; the Hindoos believe in seven mansions for all created spirits, the earth being the lowest of these, the seventh and highest the seat of Brahma; the Moslem pilgrimage is consummated when seven circuits have been made round the sacred stone at Mecca; amongst the Romans, children who died before attaining the age of seven months were denied the ordinary rites; while we may in conclusion just mention without comment, merely begging you as we run them over to bear in mind this idea of perfection, completion, full satisfaction—the vengeance that should be taken sevenfold on any who slew the wandering Cain; the seven Apocalyptic angels bearing the seven vials; the sevenfold restoration that a thief was required to make; "If thou buy a Hebrew servant, six years shall he serve, and in the seventh he shall go out free." We also read that at the first appointment of deacons seven men of honest report were chosen. "How oft shall my brother sin against me and I forgive him, till seven times? Not seven times only, but seventy times seven"—a perfect forgiveness; while in ordinary reading we often find the same curious recurrence of the number, as the seven

wonders of the ancient world, the seven ages of man, the seven champions of Christendom, seven days of the week, seven leading metals, and the same number of the greater planets. We have here *an interesting illustration of the seven-branched candlestick of the Jewish temple. Jerusalem, I need hardly say, was soon after the commencement of our era besieged by Titus, and after a prolonged resistance and terrific slaughter reduced to servitude under the Roman yoke, the Jews as a nation being destroyed, driven from their own land, and dispersed throughout the world, as we find them to this day. The Roman Senate decreed that a triumphal arch should be erected at Rome in honour of the Emperor's triumph and the success of the Roman arms; and it is from this arch, still existing, and one of the most interesting monuments of ancient Rome, that our drawing is derived. On one side we see the emperor in a triumphal car escorted by the chief citizens and laurel-crowned soldiery, and on the other a still more interesting portion of the procession, the spoils of the temple, the golden candlestick, the golden table and the silver trumpets being seen, carried on the shoulders of the victorious troops. These representations are of course perfectly reliable, as the objects themselves were in Rome immediately under the eyes of the sculptor; thus we have still extant the representations made from the actual things, the paraphernalia of the Jewish service originally formed under Divine instruction more than three thousand years ago. The sculptures are much defaced, but sufficient remains to enable us to gather a very good idea of the objects represented.

We might in the same way give many Biblical illustrations of the use of the number forty, as expressive of a time of probation and trial; thus the Israelites wandered forty years in the wilderness; again, when they were sold into the hands of the people of Mesopotamia, their cry was heard; and after their deliverance we are told that the land had rest forty years; forty years of bondage they also had to bear under the hard yoke of the Philistines.

The more common forms that have been deduced from these various numbers are the circle (see figure 23) type of unity and a never-beginning never-ending eternity, and the hexagon, octagon, and equilateral triangle already referred to. We see the use of the circle and double triangle in this example (see No 10 in our plate of illustrations) from the church of St. Sebald, Nuremburg. Amongst the Hindoos the equilateral triangle is the symbol of Siva the Destroyer, and all detached hills of conical form are regarded with reverence as the natural symbols of that god. Obelisks and pyramids were thus employed with symbolic meaning among the Egyptians, and were shown in painting and sculpture by a form like the letter T upside down. This same T-like form, but not reversed, was the symbol of eternal life, and as such was

* A diagram illustrating the paper at the time it was read, but from press of room not shewn in our sheet of examples.

borne by Thoth. The Greeks adopted it in a similar sense, and the early Christians of Egypt at first used it instead of the cross, which was afterwards substituted for it, placing it at the beginning of inscriptions as we see the cross was afterwards used; our diagram (No 13) giving a portion of an inscription of Saxon date, from Kirkdale Church, Yorkshire, is an example of this. Sir Gardiner Wilkinson, in his book on Egypt, speaks of numerous inscriptions headed by the "tau" as this form is called, which are still preserved in early Christian sepulchres throughout Egypt and the great Oasis; and it has been urged with at least great probability that this symbol of life was the form made by the children of Israel in blood upon their doorposts when the angel of death passed through the land of Egypt to smite the first-born of the nation. The tau form of cross is also met with in the catacombs of Rome, and the earliest Christian churches were built of this shape in ground plan.

A further symbolic application of the circle is seen in the nimbus surrounding the heads of saints. Du Cange, an old writer, says that it was thus made round because the wearers of it are defended by Providence, as by a shield; but there is another explanation which, though not so poetic or striking is probably truer. In classic times it was esteemed a great honour to have a portrait painted on a circular golden shield and suspended in a temple or other public place. This distinction was only conferred upon great heroes, men who in war or otherwise had served and benefitted the state. Greek inscriptions that decree these honours are still in existence. In course of time when whole figures were represented, the golden circle was still retained about the head; it may be thus seen in some of the paintings at Pompeii; this at once gives us the familiar effect of the nimbus. The nimbus being thus of Pagan origin, there was at first considerable opposition to its introduction into Christian art; but during and after the 10th century this feeling was completely overcome. In that surrounding our Saviour a cross is contained, "the similitude of the blood-stained cross," more or less enriched; but in subjects representing events before the crucifixion the cross is of simpler character than that surrounding the head of the risen and glorified Redeemer. These examples, the one from a Byzantine mosaic in St. Mark's at Venice, the other from a picture by Benozzo Gozzoli, in our National Gallery (see No 17) afford us good illustrations. (The first of these, like many other diagrams referred to in the paper, has not, from want of space, been reproduced in the present sheet of examples.)

In reference to this beautiful mosaic from St. Mark's Church I would desire to say a few words on a matter which may possibly not have previously struck some of my hearers, and it is this—the striking similiarity of feature and expression which even the most unobservant person may detect, in all the portraits, mediæval or modern, of our Lord. Little else but unreliable tradition and

legend meet us in our endeavours to arrive at the origin of this, there can be however but little doubt that the description of Christ, which Publius Lentulus sent to the Roman Senate has assisted in forming the character of the likeness. Lentulus, who was pro-consul of Judea before Herod, had himself seen the Saviour, and wrote as follows to the Senate respecting him. "At this time appeared a man, who is still living and endowed with mighty power: his name is Jesus Christ. His disciples call him the Son of God: others regard him as a powerful prophet. He raises the dead to life, and heals the sick of every description of infirmity and disease. The man is of lofty stature, and well proportioned; his countenance severe and virtuous, so that he inspires beholders with feelings both of fear and love. The hair of his head is of the colour of wine, and from the top of the head to the ears, straight and without radiance, but it descends from the ears to the shoulders in shining curls. From the shoulders the hair flows down the back, divided into two portions, after the manner of the Nazarenes. His forehead is clear and without wrinkle; his face free from blemish, and slightly tinged with red, his physiognomy noble and gracious; the nose and mouth faultless. His beard is abundant, the same colour as the hair, and forked. His eyes blue, and very brilliant. In reproving or censuring he is awe-inspiring; in exhorting and teaching, his speech is gentle and caressing. His countenance is marvellous in seriousness and grace. He has never once been seen to laugh, but many have seen him weep. He is slender in person, his hands are straight and long, his arms beautiful. Grave and solemn in his discourse, his language is simple and quiet. He is in appearance the most beautiful of the children of men." The Emperor Constantine caused pictures of the Son of God to be painted from this ancient description.

The nimbus of saints, apostles, and martyrs, is often greatly enriched by ornamental designs, as in our diagram (see fig 19); and in the 15th century it became customary to inscribe the name just within the circumference of the disc (see fig 17). This, therefore, you will see, affords us one means of identifying the age of a picture. After the 15th century it was shown merely as a circular line of gold, or a tremulous ring of light above the head, as in Paul Delaroche's picture of "The Christian Martyr," a picture which must from the popularity of the engraving and the photographs taken from it be familiar to the majority of my audience. We may occasionally in old pictures see persons represented with a square nimbus; this betokened that the person so represented was alive at the time the picture was painted. Pictures were in the Middle Ages not much employed except for religious purposes, as altar pieces, &c., and the fraternity to whom the picture was given frequently caused the portrait of the donor of the picture to be introduced, as a delicate compliment to him and an acknowledgment of the

piety which had prompted the gift. The peculiar form of nimbus like an ellipse with pointed ends generally used to surround not merely the head alone but the whole person, is called the *vesica piscis*, in allusion to its fish-like form. The use of this symbol would appear to be derived from the fact of the Greek letters of the word for fish being the initial letters also of the words "Jesus Christ the Son of God, the Saviour." In reference to this very ancient symbol, the fish, Tertullian, St. Augustine, and other early writers speak of the Christian converts as "pisciculi" in allusion to their being born again in the waters of baptism. The fish is found as a Christian symbol in the very earliest monuments. Our diagram of three crossed fish (see No. 2) is one of these early examples, dating probably the second century of our era. The vesica form, based upon the natural fish form, was introduced in the fourth century, and has continued in use ever since. A realistic representation of an actual fish, and not a conventional form for one, is sometimes, as in the catacombs for instance, clearly applied as a symbol of the Christian profession, and in allusion to such passages as "I will make you fishers of men;" at other times possibly merely to signify that the deceased was a sailor or a fisherman. As the fish, however, occurs very commonly, while other forms that might receive an interpretation as being the mere signs of the person's business are by no means so frequent, we can, I think, very reasonably conclude that it was, in most cases at least, employed as a symbol in the higher sense. Though the vesica form is still used in ecclesiastical architecture and throughout the English and Continental Gothic styles in panelling, heads of doorways, window traceries, and even occasionally for entire windows, as shown in our drawing of a window from Millom Church, Cumberland, the fish form naturally represented disappeared about the fifteenth century, and the cross definitely took its place as the sole and universal symbol of the Christian faith.

The fish, like the lotus, from its association with the sacred Nile, was held in honour by the ancient Egyptians, and was frequently introduced into their ornament. Our diagram, from an Egyptian plate in the Berlin Museum (refer to fig 18), is interesting from its introduction of both the fish and lotus form in one design, and also from the quaint fancy shown in it by the designer; for you will notice that though there are apparently three complete fish, one head and eye do duty for them all. The god Dagon of the Philistines was a composite figure—part man, part fish. We have here (fig 12) a representation of it from that wonderful series of sculptures from Nineveh which we possess in our National Museum. It was, you will remember, when a great feast was being made to Dagon, that the blinded Samson was brought out to afford sport to his enemies, and when he overwhelmed them with himself in the general ruin. It was this idol, too, which fell upon its face to the ground before the ark at

Ashdod. We will quote the narrative in the words of the inspired writer:— "When the Philistines took the ark of God, they brought it into the house of Dagon, and set it by Dagon. And when they of Ashdod arose early on the morrow, behold Dagon was fallen upon his face to the earth before the ark of the Lord, and they took Dagon and set him in his place again. And when they arose early on the morrow morning, behold Dagon was fallen upon his face to the ground before the ark of the Lord, and the head of Dagon and both the palms of his hands were cut off upon the threshold; only the fishy part of Dagon was left unto him."

The symbols used in Christian art may be broadly divided into those derived from the vegetable or animal kingdom, the human, angelic or Divine forms, and a further class of material objects that cannot be included under any of these other heads, such as the cross, the monogram, and several others. Commencing with this last section, we direct our attention first to the monogram. Before so doing, however, I would desire to say a few explanatory words about those catacombs which I find I have already referred to, and to which I shall doubtless require to make still further allusion. The ancient city of Rome, like the more modern Bath and several other towns, was built of the stone upon which the city actually stands, and for many hundreds of years the supply of building material was derived from beneath the city itself; a great extent of the ground is therefore honeycombed with vaults and subterranean passages, many of which stretch to now unknown distances into the surrounding Campagna. These vaults from their winding irregularity, the number of openings to the outer air, and their darkness and mystery, became the asylum of the early Christian Church during the great persecutions; here many converts lived for years, secure in the maze of passages, except from sudden assault of their heathen persecutors before they had time to retire into the more distant avenues. In the persecution under Diocletian several hundreds took refuge here, and being closely pursued were all slain on the spot. Stephen, Xystus, and Caius, bishops of the early Church, all suffered martyrdom here; and here, too, during the persecutions under Nero, Trajan, Domitian, Adrian, Aurelius, Diocletian, Maximinian, and several others, many thousands fell and were buried by their companions, on the withdrawal of the Roman soldiers, in niches cut in the rocky walls, tier above tier, the opening being closed by a slab of stone, and on this frequently an inscription or symbol.

It is very remarkable to notice that though disciplined in so severe a school, and with the possibility of a violent death hanging over them continually, the possibly swift release on the spot through death, or the temptations, the taunts, the bribes and scoffings of the judgment hall, the lonely death in the darkness of the dungeon, or amidst the thousands who

thronged the amphitheatre to see the followers of this new religion torn in pieces in the arena by the famished lions, their lives seem to have been singularly child-like in their faith. They walked as seeing Him who is invisible; spiritual strength triumphed over bodily weakness, death had no terror to them. One inscription commemorates "The sleeping place of Elpis," another, "Porcella sleeps here in peace;" while we look in vain for any representations of the evil spirit or his kingdom, though in the Middle Ages we find both represented with every accessory of morbid horror. Hell is generally the yawning mouth of a huge monster breathing smoke and flame, or a large cauldron set on flames, into either of which attendant spirits hurl their victims, and often with a grim sort of humour, bitterness, or satire we find some of these with kingly crowns, the monk's cowl, or wearing the mitre of the bishop. Fig. 24, a piece of English carving, and fig 26, from Nôtre Dame, Paris, are examples of this Middle Age spirit. The first of these illustrations is so admirably described in the old poem of "Sir Cauline" that we might almost fancy the example before the eyes of the writer.

"A hugye giaunt stiffe and starke,
All foule of limbe and lere;
Two goggling eyen like farden,
A mouth from eare to eare."

The nearest approach to anything of this kind in the catacombs is the use of the serpent as the symbol of sin. We see this very well shown in one of Constantine's coins (Constantine being, I need scarcely tell you, the first Christian Roman emperor), where the standard, headed by the sacred monogram, is planted upon the serpent. The magnificent ruins of the Coliseum at Rome, the great amphitheatre for the display of gladiatorial combats during the empire, owe their preservation to the Christian blood so profusely shed within its walls. After serving during ages as a quarry of hewn stone for the use of all whose station and influence procured them a share of public plunder, it was at last secured from further wilful injury by Pope Benedict XIV; who consecrated the building about the middle of the last century, and placed it under the protection of the martyrs who had there borne testimony with their blood to the sincerity of their convictions. This will explain what possibly might else puzzle some of my audience in looking at any engraving or picture of the Coliseum, the presence in the middle of this great ruined monument of Pagan Rome of an altar and other things, which from their nature point to its use in the service of the Roman Catholic Church.

Returning then to our subject, the monogram, we find the earliest and most common form of it composed of the first two letters of the Greek work for Christ. The same symbol may be found

in some few English charters and deeds, even of so recent date comparatively as the 12th century. Illustrations may be seen of this in fig 9 from a charter of King Edgar, A.D., 961, and in fig 11, from a state paper of the reign of Canute, A.D., 1031. Both of those may be seen in the British Museum, the source from whence the illustrations are derived. This is the monogrammatic form of cross which is said to have appeared at noonday in the sky, out-shining the sun in its splendour, before the heathen emperor, while a voice was heard to say, "By this sign shalt thou conquer." Be this as it may, the fact at least is certain, that Constantine did receive some sudden shock to his old superstitions, and that joining the Christian Church, he henceforth removed the old Roman eagle from the standards of the legions, placing in its stead the sacred monogram. It was also until the 5th century stamped upon the imperial coinage. It is found on the resting places of martyrs in the reigns of Adrian and Antonine, as early as the 2nd century. Many of my audience have, no doubt, without knowing why, been in the habit of spelling Christmas as Xmas. They will now see the origin and meaning of the X standing as an equivalent for Christ. We find several modifications in the treatment, thus in fig 6 we see the monogram surmounting a circle having the Greek letters Alpha and Omega on either side, meaning when translated into words,—Christ the first and the last, the Saviour of the world; or reading the circle in the second sense in which it is often used—Christ, the first and the last, eternally the same; while in the 7th figure, which like the preceding one is from the Roman catacombs, the monogram is surrounded by the triangle, symbol of the Tri-une Deity.

It is very curious that this form of monogram should in later times have been so completely supplanted by the I.H.S. with which we are so familiar. Both refer to the same Person, both are equally expressive, and the former one was the easier to carve or paint. The I.H.S. is formed by the first three letters of the Greek word for Jesus. It is often supposed that the letters I.H.S. stand for the Latin words "Jesus Hominum Salvator," Jesus, the Saviour of men; but this is not so; though alike ingenious, appropriate, and beautiful, it is an afterthought and not the original intention.

Fig 8 is an example of a form not uncommonly met with in mediæval art. It is intended to express the doctrine of the Trinity, the common Divinity of the three Persons, the distinct individuality of each member of the Godhead. Premising that the P in our figure stands for Pater, the F for Filius and the SS Spiritus Sanctus, you will see that if we desire to bring out the idea of the Divinity of each Person, we read it Pater est Deus, Filius est Deus, Spiritus Sanctus est Deus; while on the other hand if we desire to illustrate the distinct Personality we read it, Pater non est Filius, Filius non est Spiritus Sanctus, Spiritus Sanctus non est Pater.

The cross. There is no other symbol of so universal occurrence throughout the whole range of Christian art as this. The Atonement, which it symbolises, must be regarded as the very keynote of Christianity; it becomes thus of universal application in every age and in every Christian race. It is often to be met with in the catacombs, and we are all familiar with the old custom of building cathedrals and churches in this form, as we have already seen in earlier times the "tau" form similarly employed.

In old churches we may sometimes meet with a series of objects known as symbols of the Passion. Those most ordinarily selected are the cross, nails, hammer, pincers, scourge, crown of thorns, the dice and seamless robe, thirty pieces of silver, the sword and spear, and the reed and sponge. These occur throughout the whole range of mediæval art. Figures 1, 4, 16, 20, 29 and 31 are good examples. The first instance of their employment of which I have any knowledge occurs in a Saxon Psalter of the 11th century. Representations of the bread and wine of the Last Supper are often met with, sometimes modified in appearance though remaining the same in meaning, by being shown as ears of corn and bunches of grapes. The vine, thus symbolically treated, is very frequently met with in Byzantine art, the allusions being sometimes in reference to such passages as "I am the true vine," or to the parable of the vineyard whose rightful owner was slain; or in a general sense, expressive of temporal blessing, as in the benediction of Jacob by Isaac, "God give thee of the dew of heaven, the fatness of the earth, and plenty of corn and wine." Other material objects which owe their interest to the meaning involved in them are the sword borne by St. Paul, the saw of St. Simeon, the knife of St. Bartholomew—the instruments of their martyrdom. St. James the Greater bears a scallop shell and staff, the emblems of the pilgrim; he was the first apostle to go out preaching into foreign lands. In Classic art we see this same principle of the giving of distinctive objects to assist the eye in identifying, and the mind in recalling, the associations connected with the several persons represented. I need not dwell upon these; you will at once see what I mean when I mention the thunderbolts of Jove, the trident of Neptune, the bow of Cupid, together with the allegorical figure of Time with hour-glass and scythe, the mirror of Truth, the sword and scales of Justice, the reversed torch of Death.

The anchor was a very favourite symbol in early Christian times. St. Paul speaks of hope as an anchor of the soul, sure and steadfast; beyond this general and extended symbolic meaning it has a limited character as the emblem of St. Clement, who was bound to an anchor and flung into the sea in the year 100. The lamp too is a common symbol of the early Church, recalling such passages as, "Let your light so shine before men," and again "Thy word is a lamp under my feet;" and we also frequently meet with the

crown or wreath, implying sovereignty, victory won, the imperishable crown of glory.

Ascending now to the vegetable kingdom, we find that there is scarcely an object in nature which has not at one time or other borne a symbolic meaning. A very familar example is the palm branch of victory, recalling to our minds the glorified spirits of the Apocalyptic vision "clothed with white robes and palms in their hands." Our 15th illustration is a very interesting example, the palm branch surrounding the sacred monogram: it is from the catacombs of Rome. The palm tree itself is also met with: David you will remember, in one of his Psalms says, "The righteous shall flourish as the palm tree." St. Ambrose too, in one of his writings sees in its rough trunk and beautiful crowning head of leaves and fruit a symbol of the Christian life—rugged and scarred below but pleasant and fruit-bearing above. The lily, symbol of purity and spotlessness of life, and the olive, are also very commonly found. In the fragments brought over from Nineveh, we find a symbol constantly recurring in the sculptures and known as the sacred tree. Eagle-headed figures generally stand on either side, and the king and priests are represented as bringing offerings to it. It is supposed to refer to the tree of life, almost universally recognised as a mysterious element in the belief of both Eastern and Western families of mankind. It has also been conjectured that it possibly may be identified with the grove so frequently mentioned in the Bible as an object of idolatrous worship. King Asa, for instance, we read, removed his mother from being queen because she "had made an idol in a grove," and again, "The Lord shall smite Israel as a reed is shaken in the water, and he shall root up Israel out of this good land, and he shall scatter them because they have made them groves." In Egyptian ornament, the lotus, the beautiful lily of the sacred Nile, was used symbolically to express the plenty which in that almost rainless climate was caused by the fertilising periodical overflow of their great river, the melting snows of the Abyssinian highlands annually bringing rich store of wealth to the Egyptian plains. The lotus, therefore, is met with everywhere. Chaplets of the natural flowers were worn on state occasions. Jewellers made earrings and necklets from conventional representations of the flowers. The capitals of their temple columns were made in the bell form of the natural lotus; the patterns on the mummy wrappings were almost all based on this flower. No. 30 affords us a very good example of this latter use.

In Byzantine art we find this same principle of symbolism running through the forms employed; the old classic acanthus form giving place to the vine, or olive, or to a peculiar threelobed leaf very similar to our laburnum. Byzantium, I may mention for the benefit of some of my hearers, was the seat of Government towards the close of the great Roman Empire, the capital being moved from Rome to Byzantium, or what we now term Constantinople.

The word Constantinople means the city of Constantine, the transfer being made in the reign of that Emperor, when the empire was verging on decay; when overgrown and yielding to corruption within, and fierce assault of Hun and Vandal from without, the whole fabric of the State was tottering to its fall. This change of the capital however, taking place during the reign of the first Christian monarch, will you see explain, how in the first fervour of the new belief, which doubtless gained many an adherent, when it passed from the dust and darkness of the bloodstained catacombs to the palace of the Emperor, the old forms of architecture and ornament were looked upon as too suggestive of the by-gone heathen state of things to be reproduced in the new city. This symbolic use of plants is largely met with in the Bible; the lilies of the field arrayed in a splendour outvying that of Solomon himself, teaching a lesson of trust in an all-providing care; the grass that withereth, the flower that fadeth, speaking of the short estate of man, and the transience of all his glory. The purging with hyssop, the divine root and living branches, and many other examples at once occur to us.

Plants are frequently used with symbolic meaning in history and heraldry. The shamrock of Ireland, the rose of England, and the thistle of Scotland are well known examples. The rose was first borne as a Royal badge by Edward the First, while all my hearers will remember that the disastrous Civil War between the Yorkist and Lancastrian factions is better known as the "War of the Roses," from the former party selecting a white rose, and the latter a red one, as their respective badges. The Tudors all bore as badge, a rose of alternately white and red petals, known as the Tudor rose, and symbolic of the alliance of the two houses; James I., under whose reign England and Scotland became united, bore as badge a rose and thistle combined. Henry II, bore a broom plant, the planta genista, hence arose the historic family title Plantagenet. Henry IV. adopted a columbine flower, Katharine of Arragon, a pomegranate or sheaf of arrows. The daisy, too, has from time to time been used symbolically as a badge. Its French name, Marguerite, is expressive of its beauty, meaning a little pearl, hence it was used by Margaret, Countess of Richmond, and it may still be seen carved in stone over the gateway of St. John's College, Cambridge, founded by that lady. The Scottish clans also all bear their distinctive symbols. Of these we need mention but a few, as for example the oak borne by Cameron, the myrtle by Campbell, the broom by Forbes, the pine by Macgregor, the mountain ash by Maclachlan, the brake by Robertson. The thistle has been borne by Scotland as a national emblem from the year 1503. James IV. of that kingdom adopted it as his personal badge, but the expressive motto, "Nemo me impune lacessit," no one shall injure me with impunity, was not added till sometime after, as it is first seen on the coinage of James VI. in 1579. I may here just mention that an enthusiastic Scottish emigrant

some few years back, taking a little thistle seed with him for the memories of home and the sake of "Auld Lang syne" has to the great disgust of most other people succeeded in sowing New South Wales plentifully over with a plague that can now never be eradicated.

Proceeding now more especially to the animal kingdom we find this same principle of the use of symbolic forms in full force. Commencing with the lower orders of animal life, I would just remark upon the curious fact that though the Greek word for the soul, the spirit of life, and for a butterfly is the same, psyche, it was yet an emblem very rarely employed by them. This was doubtless partly from their imperfect ideas as to any future state, though we do occasionally see in Greek work the figure of a butterfly hovering over the representation of death. It seems to me, however, much more remarkable that so apt an emblem should not be met with in the works of later people possessed of a knowledge of man's immortal nature; probably it may, however, to a great extent be accounted for by the absence of that study of the lower forms of animated nature which would be needful to detect any analogy; first, the grovelling caterpillar state emblematic of present imperfection, yet a state of preparation for something higher, followed by the chrysalis state, when the creature lies for months to all appearance dead, wrapped in a leaf, or buried beneath the surface of the earth; then the appointed time when bursting from its tomb, it rises in the sunlight the perfect winged creature. In Egypt the Scarabæus or sacred beetle was dedicated to the Sun and to Pthah. It was largely used on the sculptures, and little images of it in metal or pottery were worn as charms, or placed on the breast of the dead. Our illustration of it, No. 27, is sketched from a papyrus roll in the British Museum. The Scarabæus, with various modifications of symbolic meaning is sometimes found with the head of a hawk, ram, or man. The serpent, as a symbol of evil power has had very extended application. The dragon as a symbol akin to the serpent, and the fabled phœnix rising from its ashes were both common in early art. In some old representations of the Tempter he is shown in the form of a winged serpent, and often as a little dragon, resting on the shoulder of a man and whispering suggestions of evil in his ear. Two instances of this occur to my mind, one, where he thus hindering one of the early saints who is represented writing in his cell, and a second, of a king who is ordering an execution, unjustly as we may reasonably infer from this. In representations of the temptation of Eve, he is sometimes shown with a human head. In China the dragon is the symbol of the imperial power. The Chinese delight greatly in the representation of these more or less (and generally less) awe-inspiring monsters. Fig 22 is an example. It is the handle of a vase in the South Kensington Museum, and formed part of the spoils on the sacking of Pekin. Passing now to birds we find that amongst the

Egyptians many kinds were held sacred, such as the ibis, goose and others. The vulture (called nisr) was the symbol of the Assyrian vulture-headed god Nisroch, represented in fig 8. The cock is one of the earliest symbols of Christian art. It is often met with in the Catacombs, suggesting watchfulness, vigilance, or if with St. Peter, repentance. The dove also was exceedingly common, as a symbol of the Holy Spirit, who is expressly referred to under this image in several passages of the Bible, or sometimes with the olive branch as a symbol of peace to the world after the Deluge; in this combination of ideas the raven is also often shown as an emblem of wandering and unrestfulness; this, together with the magpie, has long been deemed by the superstitious a sign of ill-fortune, and in one of the very early representations of the temptation in Eden, the painter has, with this idea evidently in his mind, represented a magpie perched upon the branches of the tree. The dove in a secondary sense was accepted, too, as a symbol of all believers, "Be ye wise as serpents and harmless as doves." The introduction of the dove is more especially common in Byzantine art. The peacock was chosen at a very early period as a symbol of the Resurrection, it is always thus met with in the earlier ages, its bad meaning of pride being of very much later application. It is generally represented as standing upon a globe, the glorified spirit rising above the world. The pelican was in later times largely used as an emblem of our Saviour in his sacrificial aspect; it was, therefore, frequently employed in mediæval work on vessels in any way identified with the communion service. The pelican has a crimson spot at the end of her bill, and when pluming herself, it appears like a spot of blood upon the breast, hence the old fable that the pelican nourished her young ones with her own blood. Our 25th figure illustrates the symbolic use of the pelican, it is derived from some mediæval stained-glass preserved in South Kensington Museum. The lectern used to support the books, though generally in old churches if an animal form at all, an eagle, is occasionally a pelican. There is a very fine one at Norwich, and in an old catalogue of the church furniture at Durham another is mentioned. Dante, in his "Paradise," speaks also of our Saviour as "nostro Pellicano."

Amongst the higher forms of animals, the lion, the king of beasts, is perhaps most commonly met with. Heralds have adopted him for the glorification of their respective countries: thus we have our old friend the British lion, the Scottish, the lions of Castile and Belgium, and to these we now add that of Abyssinia, as the state seal of King Theodore had a lion in the centre of it, and surrounding it, in Amharric and Arabic characters, "The lion of the tribe of Judah has conquered." The fifth figure on our plate is a representation of it. This, since the downfall of Theodore, has been adopted by Prince Kassai.

In like manner the eagle, king of birds, was appropriated as a symbol by ancient Rome, the United States of America, by France, Russia, Prussia, and Austria. The lion and the eagle have at all times in Christian art been brought into prominence as the symbols of St. Mark and St. John respectively. The lion signifies also fortitude, strength, majesty; it is used in a bad sense in reference to him who we are told "walketh about as a roaring lion seeking whom he may devour." The stag is often pourtrayed in the Catacombs, in allusion probably to that passage "Like as the hart panteth after the water brooks."

In ancient Egyptian mythology, the bull Apis was a symbol of the god Osiris, and a sacred bull was tended by the priests at Memphis, especially deputed to wait on him. He was consulted on all important occasions as an oracle, and omens were drawn from his actions; if he took food from the hand of the enquirer, it was held to be a favourable omen, if not, the reverse; or the person seeking a sign would whisper in his ear the matter on which he desired council, and then closing his ears till he was beyond the temple gates, listened to the first expression he heard uttered by any person, and drew from it as best he might the desired reply to his question. At his death he was solemnly embalmed, and great feasts and processions throughout Egypt greeted his successor, the visible image of their deity. The cow was sacred to Athor, the Venus of Egypt; the cat to Pasht, or Diana; the jackal to Anubis, or Mercury; the ape to Thoth. Specimens of all these examples deified and carefully embalmed, may be seen in the British Museum. The hippopotamus, pig, and ass were symbolic of Typho, the evil spirit.

Having thus briefly sketched out the use of vegetable and animal forms, we must, in conclusion, consider the circumstances under which we meet with the still higher and crowning human, angelic, or divine form. The frequent allusions in the Old Testament to the hand and the arm of the Lord as the instrument of His soverign power, such as, "His right hand and His holy arm have gotten Him the victory;" or of His might in creation, as, "Thy hands have made me and fashioned me;" of His goodness to the creatures He has made, "Thou openest Thy hands, they are filled with good;" and of His justice, "The works of His hand are verity and judgment;" are sufficient to show the wideness of the scope in which such a symbol would be appropriate and thus clearly to account for its very common use. During the first eleven centuries of Christian art it was the only symbol employed to express the first Person of the Trinity, and was generally shown as emerging from clouds veiling the brightness of the invisible majesty. During and after the twelfth century a head, and afterwards the whole body were freely introduced, but with not near so grand an effect as that produced on the imagination by

the earlier and more reverential treatment of the subject. The eye of God piercing the clouds is also sometimes to be met with.

The human figure was often employed in a sense half symbolic, half historic, such as in rude sculptures of the finding of Moses, where the idea of baptism was intended to be brought out as well as the historic fact; so too with the passage of the Red Sea by the Israelites, primarily the historic fact, secondarily, the chosen people entering through baptism the land of promise. These subjects, and many others thus treated, are to be met with in the catacombs we have already so frequently referred to.

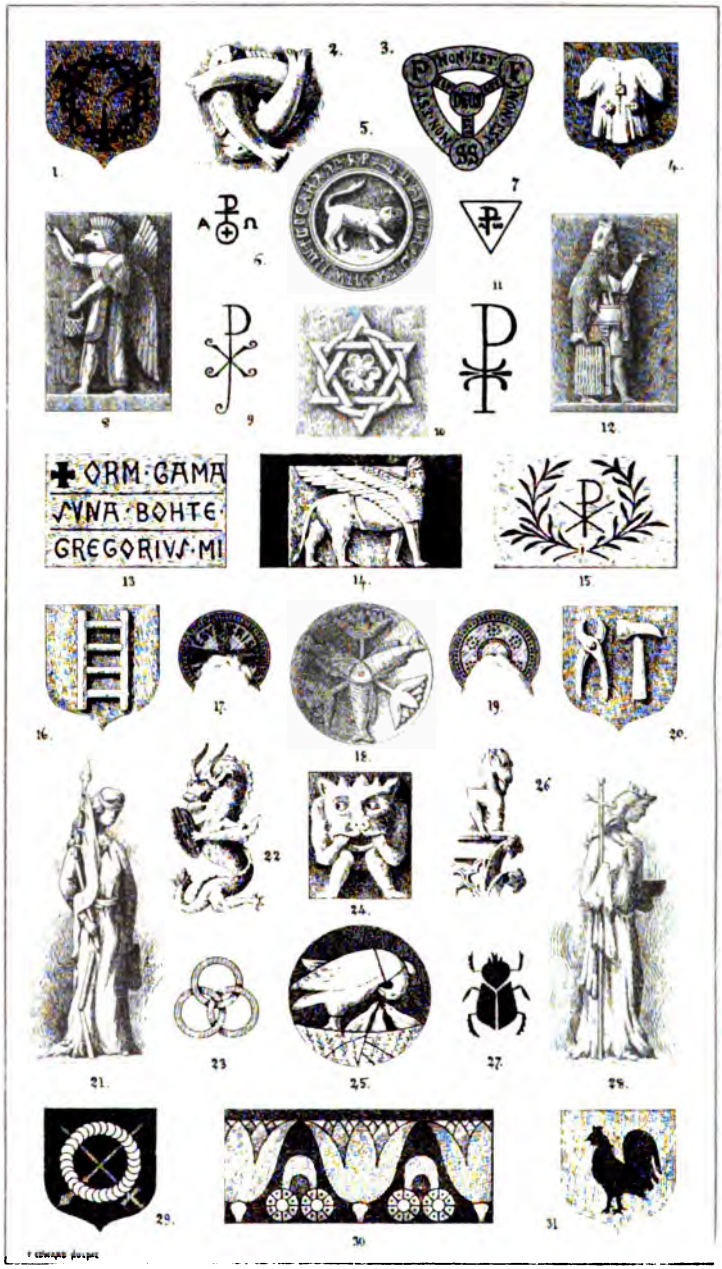
Throughout the whole course of Christian art we meet with numerous examples of the use of the angel form. It is the symbol of the apostle Matthew, as the lion, the ox, and the eagle respectively were the symbols of St. Mark, St. Luke, and St. John. It is very curious to notice how prevalent these four figures, the man or the angel, the lion, the ox, and the eagle have been in almost all early periods of art; thus in Egypt we see the human-headed sphinx, and those having heads of the hawk or eagle, while in Assyrian art we find human-headed bulls (see fig 14), or figures in human form but winged and with the heads of eagles (see fig 8). The four living creatures that the prophet Ezekiel saw in his mystical vision, were of this character, for he expressly tells us that the likeness of their faces was as those he had seen by the river Chebar, a river in Assyria that runs into the Euphrates about 200 miles north of Babylon, whither he was carried captive together with the main bulk of his nation by the Assyrian king, Shalmaneser, 721 years before the Christian era; the Assyrian sculptures, therefore, must have been familiar to him and to those to whom he was sent to prophesy. In the wonderful vision seen by John at Patmos of the four mysterious creatures adoring ceaselessly before the throne, the first was like a calf, the second like a lion, the third creature had a face as a man, and the fourth was as a flying eagle. Probably it was upon these two passages of Scripture that the evangelistic symbols were based. St. Jerome and St. Ambrose in their writings both refer to an opinion of their times that the four creatures represent our Lord in four different aspects; and Wycliffe, in his translation of the New Testament, published in 1380, refers to the belief of both these old writers; his English is too quaint for direct quotation, but the substance of it is that Matthew is represented as a man or angel, inasmuch as he dwells chiefly in his gospel upon the manhood of Christ; Mark is represented as the lion, as he treats most fully of his rising again; Luke is represented as the ox, writing as he does more especially concerning the sacrifice and the priesthood; while John is represented as the eagle, as he passes in his writings over many of the little details given by the other evangelists, and dwells most lovingly on the sacraments and holy mysteries; while the other theory, slightly differing from

this, sees in the life of our Saviour himself four great incidents which the forms symbolise, the man referring to His human birth, the sacrificial ox to His death on the cross, the lion to His resurrection, and the eagle to His ascension. The four evangelists are in their human form occasionally represented as bearing urns, from whence flow streams of water, symbolic of the water of life covering and fertilising the earth. The word angel, Greek in its origin, signifies a messenger, or more literally a bearer of tidings; in this sense the Greek Church entitled our Saviour himself "The great Angel of the will of God;" we therefore in work executed under Greek influence generally see him represented as winged.

We occasionally, and more especially on the Continent, meet with two curious figures representing the Jewish and the Christian Church. The Jewish Church is represented as blinded, a veil being over her eyes, in one hand she bears the tables of the law, in the other a drooping banner on a broken staff; while the other figure wears the crown, holding in one hand the pledge of communion with her Lord, and in the other the once despised cross, the symbol of her faith and power. Figs 21 and 28 afford very good examples of these figures; they are from Strasbourg Cathedral.

In mediæval works the soul of man is represented either in human or angelic form, generally as a little naked child issuing from the mouth of the dying person: "Naked came I into the world and naked shall I return again;" sometimes draped, "Clothed upon with the robe and righteousness of God;" sometimes issuing as a little black imp or fiend: in most cases good and bad angels stood by to receive it and to contest its possession.

I have thus this evening endeavoured very briefly, very imperfectly at the best, to give you some insight into the inner vein of meaning found running through so much of the art work of the past; and while we may ourselves very justifiably rejoice that we live in a time when the opportunities both for acquiring and imparting knowledge are so widely extended, we may, nevertheless, I think, look back with both interest and profit to the time when this was not so, and when much that now seems to ourselves but rude and almost barbarous in its quaintness bore a wealth of inner meaning for those to whom it was intended to appeal. If in looking back upon the past I have been able to show you that even in these, in many respects deservedly called, dark ages, in the midst of much superstition and folly, there has ever been a yearning desire to know more of wisdom, to try and feel something of that which passeth knowledge, and seeing nothing trivial in nature, since all bore witness of the power and goodness of the Creator and Sustainer of all, our evening will not, I think, have been altogether spent in vain.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There were 36 persons present, 3 Hon. Mem., 17 Mem., 1 Associate, and 15 Visitors.

LIST OF ILLUSTRATIONS.

1. Symbol of the Passion. The crown of thorns.
2. Fish, from the catacombs of Rome.
3. Symbol of the Tri-une Deity, from old glass painting.
4. Passion-symbols. The dice and seamless robe.
5. The seal of Theodore, late ruler of Abyssinia.
6. The Sacred monogram, &c., from the Catacombs of Rome.
7. The equilateral triangle, &c., from the Catacombs of Rome.
8. Nisroch. The Assyrian collection, British Museum.
9. Sacred monogram. Charter of Edgar, British Museum.
10. Geometric symbol. St. Sebald, Nuremburg.
11. Sacred monogram. Charter of Canute, British Museum.
12. Dagon. The Assyrian collection, British Museum.
13. Saxon inscription. Kirkdale Church, Yorkshire.
14. Human-headed bull. Assyrian. British Museum.
15. Palm wreath and monogram. Catacombs of Rome.
16. Passion symbol. The ladder.
17. Nimbus. Picture by Benozzo Gozzoli. National Gallery.
18. Plate, Egyptian. Museum, Berlin.
19. Nimbus. Picture by Benozzo Gozzoli. National Gallery.
20. Passion symbols. The hammer and pincers.
21. The Jewish synagogue. Strasbourg Cathedral.
22. Dragon. Chinese vase, South Kensington Museum.
23. Symbol of the co-equal, co-eternal Trinity.
24. Mediæval grotesque. English.
25. Pelican. Stained glass, South Kensington Museum.
26. Mediæval grotesque. French.
27. Scarabæus. Egyptian papyrus. British Museum.
28. The Christian Church. Strasbourg Cathedral.
29. Passion symbols, sword, spear, and thirty pieces of silver.
30. Lotus ornament. Mummy wrapping. British Museum.
31. Passion symbol. The Cock.

MEETING HELD MARCH 8TH, 1872.

THE President announced that members could resume the care of the garden, that J. B. Kite had resigned Membership, that A. P. Macgregor had been appointed Sub-treasurer in the place of R. W. Doyne, who had resigned that office, and that the Committee had provided a book for Member's autographs, which will be demanded in future.

M. A. Chilton then read a paper on Ozone.

F. J. H. Jenkinson exhibited a collection of British Shells, presented by the Rev. F. W. Farrar, F.R.S., and a specimen of Chinese Window-shell, (*Placuna placentor*) used for windows, lent by the same.

The President exhibited a Petroleum Shell, some Parisian Siege bread, and the lock of a gun, used as grape-shot by the Communists, presented by E. Millais, also a Bullock's Horn and burnt-wood from the burning of Moscow, the palate of a Cancerivorous fish, and some crystallised Bismuth, presented by W. Fergus, Esq., M.D.: also a Stalactite from a well at Busage, Gloucestershire, and a specimen of old stained glass, presented by M. A. Chilton.

There were 30 persons present, 2 Honorary Members, 18 Members, and 10 Visitors.

MEETING HELD MARCH 22nd, 1872.

THE minutes of the previous meeting were read and confirmed.

The President announced that D. E. Oliver, W. M. H. Milner, S. F. Townsend and A. H. Dennis were elected members, and then read a paper on Crocodiles.

There were 45 persons present, 2 Hon. Mem., 23 Members, 1 Associate, and 19 Visitors.

MEETING HELD APRIL 8th, 1872.

THE minutes of the previous meeting were read and confirmed.

The President then remarked that the Society had just entered upon the 9th year of its existence.

A. Babington, Esq., read the following paper on

THE ARCTIC REGIONS AND ESQUIMUAX.

In the last paper which I read before the Society I took you into the tropical world: this evening I shall take you into the arctic world. Of all the strange contrasts which our globe presents, this surely is the strangest; the contrast between the land of burning suns and drenching rains, of ceaseless life and motion, of teeming exuberance and fertility such as the mind of man can scarcely conceive; of perpetual summer and perpetual day, and the land of freezing snows and blighting winds, of unbroken monotony and silence, of ceaseless winter and of ceaseless night. I will endeavour this evening, as far as the limits of my paper and the imperfections of my knowledge will allow, to give you some idea of this marvellous portion of our globe, which, during the greater part of the year might almost be described in the immortal lines:

> A universe of death which God by curse
> Created evil, for evil only good,
> Where all life dies, death lives, and nature breeds
> Perverse, all monstrous, all prodigious things,
> Abominable, unutterable, and worse
> Than fables yet have feigned or fear conceived.

From one part of my natural task, indeed, I may consider myself exonerated. Those members of the Society who heard or who have since read in the Report the paper which was written last half on icebergs, will not need from me any description of those frozen Alps of the Polar Sea. Let me rather select one or two of the points which would impress us most if we were suddenly transported into the Arctic regions.

First, then, I would observe the death-like silence which seems to have sunk like a heavy weight on the hearts of the bold mariners who have from time to time ventured on that perilous journey. We know how perfect the stillness is among us on a breathless winter's day, when the streams are stayed by the coating of ice, and the branches are weighed down by a load of snow, and the cattle are huddled disconsolately on the lea. But what is this to the unbroken silence of an Arctic coast which has been snow-bound and frost-bound for long weeks, and where all traces of nature's vitality and creative powers have vanished from the eye of man? And this leads me to notice the second characteristic of the Arctic winter (and remember that the Arctic winter occupies eight or nine months of the year) namely, its intense loneliness. That is no country where man and the signs of man's presence may be seen at every turn. A few huts of snow scattered over miles and miles of snow-clad plains, a white bear, perhaps, shuffling along in search of prey, an Arctic fox darting from crevice to crevice in the rocks, a lonely snowy owl sailing on the icy wind; these are the only living creatures that

break the awful solitude. Often must the Arctic navigator enter into the spirit of those beautiful lines:

Oh, wedding-guest! this soul hath been
Alone on a wide wide sea,
So lonely 'twas, that God Himself
Seemed scarcely there to be.

It is not till the return of the short-lived spring that the land of desolation is once more peopled with living forms, when the enormous flocks of migratory wild birds hasten their flight northwards, where in the morasses or on the lakes, on the banks of the rivers, on the flat strands, or along the coasts teeming with fish, they can find abundance of food, and build their nests with greater security. At the same time shoals of sturgeon and salmon are driven by instinct to quit the seas and enter the rivers, where they lay their spawn in the quiet and sweet waters of the river or lake; and the reindeer leaves the forests to feed on the lichens and herbs of the level plains, and to escape from the noxious gad-fly, which are bred in the morasses of the forests.

The third striking feature in the Arctic winter is the darkness. We, who talk of the shortening days with such pathetic melancholy, and think it the greatest hardship that we must rise to our morning tasks by the light of the gas-lamp dimly burning, what can we think of a land in which for weeks together the inhabitants never see the sun's rays, in which they are unlighted save by the beams of the cold fruitless moon, or the little oil-lamp suspended from the roof of their cabin? Try to realize the sensations of the Arctic explorer who made the following entry in his diary on the 21st of December:—"Mid-winter day,—out of the Arctic regions it is better known as the shortest day. At noon we could just read type similar to the leading article of the *Times*. Few people could read more than two or three lines without their eyes aching." There is, however, one glorious compensation for this prolonged winter darkness, I mean the Aurora Borealis. Some of you may have seen that wonderful phenomenon last half, that is, you may have seen streaks of scarlet, or crimson, or magenta light shooting up from the horizon to mid-heaven, and making the sky look rather like a superior edition of a C house jersey. Very different is the Aurora Borealis of the Polar sky,

"Not as in southern climes obscurely bright,
But one unclouded blaze of living light."

Let me read you a graphic description given by Captain Hall: "I had gone on deck several times to look at the beauteous scene, and at nine o'clock was below in my cabin going to bed, when the Captain hailed me with these words: "Come above Hall, come at once! The world is on fire!" I knew his meaning, and quick as thought I re-dressed myself, scrambled over several sleeping Esquimaux close to my berth, and rushed to the companion stairs.

In another moment I reached the deck, and as the cabin door swung open a dazzling and overpowering light, as if the world were really ablaze under the agency of some gorgeously-coloured fires, burst upon my startled senses. How can I describe it? Again, I say, no mortal hand can truthfully do so. Let me, however, in feeble, broken words, put down my thoughts at the time, and try to give some faint idea of what I saw. My first thought was—"Among the gods there is none like unto Thee, O Lord! Neither are any works like unto thy works." Then I tried to picture the scene before me. Piles of golden light and rainbow light scattered along the azure vault, extended from behind the western horizon to the zenith: thence down to the eastern, within a belt of space, 20 degrees in width, were the fountains of beams, like fire-threads, that shot with the rapidity of lightning hither and thither, upward and athwart the great pathway indicated. No sun, no moon, yet the heavens were a glorious light, flooded with light. Even ordinary print could easily have been read on deck. *Flooded* with rivers of light! Yes, flooded with light; and such light! Light all but inconceivable. The golden hues predominated, but in rapid succession prismatic colours leaped forth. We looked, we saw, and trembled; for even as we gazed the whole belt of aurora began to be active with flashes. Then each pile or bank of light became myriads; some dropping down the great pathway or belt, others springing up, others leaping with lightning flash from one side, while more as quickly passed into the vacated space; some twisting themselves into folds, entwining with others like enormous serpents, and all these movements as quick as the eye could follow. It seemed as if there were a struggle with these blazing lights to reach and occupy the dome above our heads. Then the whole arch above became crowded. Down, down it came, nearer and nearer it approached us, while the fires seemed to be descending upon us; one of our number could not help exclaiming, "Hark! Hark! such a display! almost as if a warfare were going on among the beauteous lights above; so palpable, so near, it seems impossible without noise." But no noise accompanied this wondrous display: all was silence."

Let me turn to another point in the Arctic world which deserves notice, its intense cold. We, in England, really do not know what cold means. We talk of it as something prodigious if, for a few days in the course of the year, the thermometer sinks a few degrees below freezing point: but if we only go far enough towards the north, we shall reach a zone where in mid-summer on the longest day mercury rises only four degrees above freezing point, and where Kane, one of the famous Arctic travellers, found his best spirit thermometer marking 100 degrees below freezing point on the fifth of February. At that time chloric ether was converted by the cold into a solid body, and

even carefully prepared chloroform showed a sort of film on its surface. Wherever any part of the body was exposed a sort of steam exhaled from it, and the air grew so sharp that men felt when they drew in their breath as if they were inhaling steel filings.

It is a mistake to suppose that the cold increases as we advance further north. For instance, the large continental tracts of Asia and America have a far greater winter cold and intenser summer heat than many coast lands or islands which, as far as mere reckoning of degrees goes, lie nearer to the pole. Thus the western shores of Nova Zembla have a winter temperature 32 degrees higher than that of Jakutusk in the heart of Siberia, though Jakutusk is twenty degrees nearer the Equator, and therefore ought to be proportionally warmer. There are two chief reasons for this variation in the temperature: in the first place, the influence of the sea, even in the most northern regions visited by man, especially when favoured by warm currents, has been found to temper the severity of the winter and to diminish the heat of the summer: this is the case in our own island also, the winter of England being less cold and the summer of England less hot than that of countries in central Europe which are precisely the same distance from the Equator. And thus it is that by a wonderful adaptation of natural laws the waters which flow from the Equator affect the intensity of the frost in Spitsbergen. In the second place, the Arctic regions like our own country are greatly affected by the direction of the wind. For instance, in the Archipelago to the North East of America the great depression of the temperature, that is, the greater intensity of the cold is probably due to the northerly winds which choke the straits and bays with ice: on the other hand, southerly winds blowing down the valley of the Mackenzie river, the greatest stream which empties its waters into the Arctic ocean, foster the growth of an abundant vegetation. A sudden change of wind in the Polar lands will sometimes raise the temperature from a cold able to turn mercury into a solid ball to a cold above the freezing point of water; and a warm wind has caused rain to fall in Spitsbergen in the month of January, almost as strange a phenomenon as it would be for us to find the bathing-place frozen in the month of July.

The question next suggests itself, if such be the severity of the cold, how can any human being endure it? How is it possible for an Englishman reared in this temperate climate, with all the appliances of luxury and science at hand, to venture into the awful wildernesses of cold to brave every form of privation and suffering, and yet to live to tell the tale? Pertinent as the question may seem, the answer is not really far to seek. Nothing is more remarkable in the constitution of man, nothing stamps him more indisputably as the lord of the universe than the power which he possesses of adapting himself to all changes of climate and circumstances. He can change his food,

his clothing, his habits of life to suit the transition even from the torrid to the frigid zone. As he advances northwards, with each fall of the thermometer his body developes an increasing warmth; for the air becomes condensed by the cold and the lungs consequently inhale at every breath a greater quantity of oxygen, and this increase of oxygen quickens the process of combustion which goes on within: the cravings of an encroaching appetite are appeased by a larger supply of animal food, and this in turn enriches the blood and enables it to circulate with greater rapidity. We laugh at the stories of the Russians who, on visiting England for the first time, swarmed up the lamps in Piccadilly to drink the oil: but in truth it is a craving for this nutritious food, which (strange as it may sound to us) enables the inhabitants of the land of perpetual snow to endure the inclemencies of the long northern winter. I have transcribed a few sentences of Dr. Kane on this subject. "The mysterious compensation by which we adapt ourselves to climate are more striking here than in the tropics. In the Polar zone the assault is immediate and sudden, and, unlike the insidious fatality of hot countries, produces its results rapidly. It requires hardly a single winter to tell who are to be the heat-making and acclimatized men. Petersen, for instance, who has resided for two years at Uppernavik, seldom enters a room with a fire. Another of our party, George Riley, with a vigorous constitution, long established habits of free exposure, and active, cheerful temperament, has so inured himself to cold, that he sleeps on our sledge journeys without a blanket or any other covering than his walking suit, while the outside temperature is 62 degrees below freezing."

In my paper on the Malay Archipelago I had occasion to notice the evidence which was supplied by that remarkable group of islands of the vast changes which from the earliest periods have been taking place on the surface of the globe, changes so prodigious that an eminent geologist has boldly asserted that every spot which is now dry land has at some former period been sea, and every part of the space now covered by the deepest ocean has been land. To these changes the geological discoveries in the lands of the north bear striking witness. There is incontestable proof that the region of intolerable cold where the humblest shrub is now unable to battle with the freezing blasts, was at one epoch in the enjoyment of a climate comparatively mild. In north Greenland a large forest lies buried on a mountain surrounded by glaciers, more than 1000 feet above the level of the sea. The trunks and branches, nay, even the leaves, fruit-cones, and seeds have been dug out of the soil, and botanists have thus been enabled to determine the species of the plants to which they belong. They show that not only firs, but oaks, plaintains, elms, magnolias, and even laurels, plants in short which need a climate such as that of Geneva to thrive in, flourished here during the miocene period; and thus a

land which is now a great ice-bound desert was at that time bright with the foliage of waving forests. What is the explanation of this change? no one, I presume, can decide the point with certainty, but the following seems to be the most plausible suggestion: it has been conclusively ascertained (as I have already mentioned) that the distribution of sea and land exercises a decided influence on the temperature of the earth: let us suppose a time, then, (and the hypothesis is perfectly legitimate) when the Arctic zone instead of containing an area of land exactly co-extensive with the area of sea, was nothing but one boundless expanse of sea with a few comparatively small islands sown in the midst of it. The result would be that no snow and ice would lie during the whole year, even on the summits of the highest mountains, and that the trees which have been discovered there would have been able to flourish in full luxuriance.

This leads me to say a few words on the subject of Arctic vegetation. The Arctic regions may be divided into the great zones, the forest zone and the treeless zone, or "tundri" as they are sometimes called, and as I shall for convenience sake call them. The forest zone of the Arctic world is of enormous extent, so enormous that it is difficult to give any adequate idea of it. The forests in the valley of the Amazon are fifteen times greater then the whole of the united kingdom; and yet these tropical forests are as nothing compared with those forests of the Arctic world, which stretch over three continents between the fifteenth and twentieth degrees of latitude, and which in European Russia alone occupy 200,000,000 acres. Unlike the rank and luxuriant and varied vegetation of the tropical world, the Arctic forests contain only one genus, the coniferæ, including the various species of the fir or pine. Perhaps the most remarkable feature of these northern forests is their apparent youth, and the traveller, as he journeys through their midst, sets them down as 50 or 100 years old, till a closer examination reveals their shrivelled boughs and aged stems. This strange fact will seem strange no longer if we remember that the short Arctic summer of a few weeks, though able to produce new shoots, is unable to form new wood, and thus on the confines of the forest to the extreme north four hundred years are needed for the formation of a trunk the thickness of a man's body.

If the extent of the forest zone is great, the extent of the treeless zone is greater, greater than the African Sahara or the American Pampas, greater than the whole continent of Europe. The reason why this zone has no trees is to be found not so much in the actual increase of cold as in its exposure to the icy winds, which level all vegetation to the earth and in the teeth of which no living thing can thrive. Hence all plants in this part of the world may be said to live between the air and the earth, for they scarcely rise above the soil, and their roots creep along

the surface without power to enter it. Even the *Salex Lanata*, the giant (if I may use so paradoxical a word) of these treeless wastes, never grows more than five inches high, while its stem, 10 or 12 feet long, lies hidden among the moss, indebted for its life and shelter to its humble neighbours. But how is it that vegetation can live at all in this intense cold? what preserves even lichens and mosses from a frost bitten death? Strange as it may seem, it is the snow. For snow (to use a scientific expression) is so bad a conductor of heat that in mid-winter, in Lat 78, where the surface temparature was 62 degrees below freezing point, Kane found that four feet deep the temperature was not more then 30 degrees below, and eight feet deep it was only 6 degrees below freezing point: and Kane justly adds that "no eider down in the cradle of an infant is tucked in more kindly than the sleeping dress of winter about the feeble plant-life of the Arctic zone." "A man must come to these Arctic wilds (observes a recent winter) to perfect his love and reverence for these sweet gifts of nature. They seem to be clothed here with a new significance, an intelligence of their own, which warns them that their life must needs be short, and that they must quickly prepare for their end, and provide speedily for their posterity. From the time when lingering winter chills the lap of spring to that when the very slight warmth which the summer has given to the earth has been dissipated by the returning frosts; between the dark snow of these two periods there occurs a remarkable series of transformations. The snow has scarcely disappeared before the seed swells into life; and in a few days green supplants the universal whiteness. Blossoms gay and smiling burst forth with corresponding rapidity; the new seeds are formed, and fall to be covered with their winter cloak; and from the beginning to the end there is scarcely an interval of six weeks."

I have already mentioned that the majority of the Arctic birds are migratory, that they fly northwards in the summer to lay their eggs and fly southwards again as soon as the winter sets in. I will select for notice one of the many species of these migratory birds, the Arctic lumme or diver. Dr. Hayes has given a most amusing account of his experience of them. While anchoring in a fiord in Greenland, he saw at a distance a huge cliff rising half a mile out of the water. Thinking it a likely place for birds he obtained leave of the captain to have a boat manned, and rowed towards it. As they approached the cliff they heard a murmuring sound like that of distant falling waters: when they arrived close under, this sound increased, and became so loud that they were obliged to elevate their voices to make themselves heard. At the same time the cause of it became apparent. The whole face of the rock was fringed with ledges from top to bottom, occupied by myriads of birds who kept up an incessant fluttering and screaming. On every one of the ledges from the water's edge to the summit, birds were sitting, packed close

together and facing outward, sitting bolt upright, row above row, crowded into the smallest possible compass, and looking for all the world like soldiers, with white coats and black caps shoulder to shoulder on parade. Their strange attitude which at first seemed inexplicable was soon explained when Dr. Hayes discovered that each bird laid but one egg, that it made no nest whatever, and laid its single egg upon the bare rock. The only way, therefore, in which they can cover the egg is by propping it on one end with their bills and then squatting upon it. After listening for a few moments to the Babel of cries, Dr. Hayes and his party fired into the midst. In a moment, all was silent. Every bird ceased its scream as it flew from its perch, the vast numbers darkening the air. Then as they darted towards the sea, the wild flutter of their wings was like the rush of a tornado, and immediately afterwards they alighted upon the water with a great splash. It was not long however, before they returned, and then ensued a curious scene. Many of the birds were observed to be in a state of violent anger with their nearest neighbours. With ruffled feathers they scolded each other at the top of their voices, plucked out each other's feathers, and pecked at each other's eyes. A deeper cause for this disturbance than mere love of fight was soon discovered by the spectator. Owing to the precarious position which the eggs occupy upon these narrow ledges, it often happens that when the bird flies away, either to get its breakfast, or in consequence of an alarm, the egg rolls off into the water and the mother returns to find her seat empty. Then arises a dilemma such as that which Launcelot experiences in the "Merchant of Venice," when he hesitates whether to run away from his master or no. "Good Launcelot," says the fiend, "budge." "Good Launcelot," says conscience, "budge not." "Conscience," say I, "thou counsellest well:" Fiend say I, "thou counsellest better." So too it is in the case of the childless diver. "Bird," says Virtue, "steal not." "Bird," says maternal instinct, "steal." And as the counsel of maternal instinct sounds sweetest in her ear, the mother appropriates the egg of her nearest neighbour. The neighbour, when she returns, naturally objects, and a free fight ensues, which terminates either in the defeat of one or other of the combatants, or in the egg rolling off into the sea, when both parties separate in search of fresh thefts.

Of the sea animals in the Arctic world I have chosen for mention the Polar or white bear. For, odd though it may sound, the Polar bear is as much a sea animal as the seal or the walrus, never voluntarily taking to the land and only when their food has failed them on the ice, or when they are pursued by enemies, or when the ice has gone to pieces under them. Their natural home is on the floating ice, and they have frequently been discovered on large ice fields in mid ocean, more than 100 miles from the nearest point of land. But since these ice fields are perpetually drifting southwards, and since the

further southwards they drift the more rapidly they melt, what hinders these Polar bears from being floated down into latitudes which are too warm for them? They are two chief reasons why this never takes place: first, by an admirable instinct the Polar bear hunts by scent and is always running *against* the wind which blows from the north: accordingly, while the ice is steadily moving southwards, he is steadily moving northwards. Secondly, the ice fields on which he lives are practically limitless in extent, some reaching for scores of miles and constantly receiving fresh additions from the north. Add to this that the Polar bear is a splendid swimmer, and has been seen swimming in the open sea many miles from land, where there was not a single piece of ice in sight.

The chief food of the Polar bear is seal's flesh. Crouching down on the ice when he has marked his game, he doubles his fore paws underneath him and pushes himself on with his hind legs. As soon as he has got within reach, he springs on his victim, whether in the water or upon the ice. He will attack men when hungry or provoked, but never when he can obtain food which he prefers. McClintock tells a story of an Esquimaux who had set some seal nets. In the evening he went to look at his nets and found that he had captured a fine seal. Hauling up his booty on the ice, he proceeded to disentangle it from the meshes. As he was thus employed, he felt a tap on the shoulder. Imagining that it came from his companion, he did not give himself the trouble to look round, till he felt a second smarter blow. What was his horror on glancing over his shoulder to see instead of his comrade's face the forbidding visage of a peculiarly grim old white bear, with a glance in its eye which seemed to say, "Now then young man come out of that." Need I add that he *did* "come out of that" with all possible promptitude, that he did *not* venture to disturb the meal, and that he did *not* wait to see the meal finished?

The strength of these beasts is almost fabulous. It is the habit of Arctic voyagers to leave in certain spots depositaries of provisions for future use. One such had been constructed by Kane with the utmost care. It was made of rocks which had been got together by very heavy labour, and adjusted by means of capstan bars as levers. Yet these tigers of the ice (he says) seem to have encountered hardly an obstacle. Not a morsel of pemmican remained except in the iron cases, which being round, with conical ends, defied both claws and teeth. They had rolled and pawed them in every direction, tossing them about like footballs, although over eighty pounds in weight. An alcohol can, strongly iron bound, was dashed into small fragments, and a tin can of liquor smashed and twisted almost into a ball. The claws of the beast had perforated the metal and torn it up as with a chisel. They were too dainty for salt meats: they had an evident relish for ground

coffee: old canvas was a favourite for some reason or other; even our flag, which had been reared to take possession of the waste, was gnawed down to the very staff. They had made a regular frolic of it, rolling our bread barrels over the ice, and tying up our heavy india-rubber cloth, which they were unable to masticate, in unimaginable hard knots.

I have endeavoured to give you a faint idea of the character of the Arctic world: let me now try to introduce you to the best known of the tribes who people it, the Esquimaux. Of all uncivilised races none occupy a larger space. Their various tribes extend from Greenland to Labrador, over all the coasts of Arctic America to the extreme north-eastern point of Asia. Many are independent: others are subject to Russian, Danish, or British rule.

The Esquimaux are not a beautiful race: their eyes are narrow and dull, their face is broad and flat, and the cheek-bones are so high that if a flat ruler were laid from cheek to cheek, it would in many cases not touch the nose. To these drawbacks is added another still more grievous: no Esquimaux touches any part of his person with water from one year's end to another: such an idea never enters his head. If an Esquimaux boy were to come to Marlborough, he would never dream of putting down his name for a bath, and if it were suggested to him that it might be advisable to do so, he would probably reply contemptuously that the time might be much better employed in brewing coffee, and consuming slogs, for the Esquimaux is as devout a believer in eating as he is a devout disbeliever in washing.

The result of this abstinence from water is that the Esquimaux' face can boast of a rather more opaque hue than it would otherwise possess. An Arctic traveller was anxious to civilize a little Esquimaux girl, and began the process with soap and water. When he had with patient toil removed the numerous layers of dirt, he discovered a charming pink and white complexion which would not have misbecome an English maiden.

The dress of the Esquimaux is elaborately arranged with a view to the exclusion of the greatest amount of cold. The outer jacket is something like a broad-tailed dress coat, cut short at the waist in front and hanging down behind as far as the middle of the calf. It is always provided with a hood, which can be drawn over the head, and is generally made of rein-deer skin. Under this coat they wear a second of lighter material, with the fur turned inwards. In like manner they wear two pair of trousers, the one with the fur outside, and the other with it inside. The feet are even more carefully protected: in the winter time the Esquimaux first draws on a pair of boots with the fur inwards, then slippers of soft seal-skin, so prepared as to be waterproof, then another pair of boots, and lastly, strong seal-skin shoes. Finally, they always put on mittens, which, when hunting, are water-proof.

The women's dress is much the same as the men's, except that the hood behind is sufficiently capacious to contain a baby, and thus serve as a cradle, and their boots are sufficiently capacious to act as a portable play-box, filled with a choice assortment of miscellaneous articles, including the materials for their mid-day meal. Indeed the Esquimaux women are the only people on the face of the earth, as far as my knowledge goes, sufficiently ingenious to hit upon the idea of carrying about their dinner in their boots.

In a country where the thermometer remains for months together many degrees below zero, and where ice and snow are the only visible objects, it is clear that houses cannot be built as in other countries. Where there are no trees, wooden houses are out of the question; and where the cold is so intense that ice has been known to choke up the iron flue of a stove always burning, it is clear that clay could not be baked into bricks, nor stones cemented with mortar. Hence the Esquimaux submits to circumstances, and makes his hut of the only available material, snow.

The process is very simple. The houses are dome-shaped, and formed of slabs of snow placed one upon another, from four to six inches in thickness, and about a couple of feet in length. The building is lighted by a broad piece of transparent freshwater ice, about two feet in diameter, which casts a light not unlike that thrown by ground glass. The rapidity with which these houses are erected is astonishing. When M'Clintock for a few nails hired four Esquimaux to build a hut for his party, they completed it in an hour, though it was 8 feet in diameter and 5½ feet high.

In the middle of the hut is erected a slight scaffold, which supports a rudely-made net, and under the net is placed the one essential piece of furniture of the house, namely, the lamp. This is a very simple matter; an oval-shaped dish of stone is selected, and around the edge of it is placed a long wick of moss, then it is filled with oil, and a large quantity of blubber is heaped in the midst to keep up the supply. This lamp, insignificant as it may seem, is simply invaluable to the Esquimaux, not so much for its use in cooking (because the Esquimaux likes raw meat quite as well as cooked) as for the warmth which it gives out, for the water which is obtained by melting snow over it, and for its use in drying clothes. When the Esquimaux returns from his day's hunting, his wet clothes, especially his wet boots, are put into the net which hangs above the lamp, and remain there till they are dry. Perhaps some of you after a long walk through the snow, have, like myself, tried the plan of placing your boots by the fire to dry, and after the process of drying has been completed, have discovered on putting them on again that they are (to use a figurative but graphic expression) as hard as boards. How, then, does the Esquimaux, to whom it is essential that his boots should be soft, springy, and flexible, manage under these circumstances? I am afraid

you will think that I wrote this on the first of April, but I can assure you that I am perfectly serious when I say that he makes his boots supple again by the simple plan of commissioning his wife to chew them. Now I have never chewed a pair of boots myself, and I do not suppose that you have either, but I suppose you will be prepared to acquiesce in my assertion that it takes some considerable time, and we therefore arrive at this remarkable result, that there are certain members of the human race who spend a large portion of their time and a large measure of their energies in the one absorbing occupation of chewing boots.

The food of the Esquimaux is almost exclusively animal; this is an absolute necessity for two reasons. In the first place, no vegetable food would grow in a land which for the greater part of the year is covered with ice and snow. And in the second place, it is a well-known chemical law that certain definite proportions of oxygen and carbon are necessary to keep up the temperature of the body. The oxygen is contained in the air which we breathe, the carbon in the food which we eat. The more oxygen we draw into our body by breathing, the more carbon must we take in by eating. Now there are two ways in which we may be compelled to consume a greater quantity of oxygen: first, by an increase in the coldness of the air, which makes it denser, and therefore compels us at each breath to draw in a greater volume of oxygen than usual; secondly, by an increase in the rapidity of our inspiration; and this increased rapidity may be due to one of two causes, either we breathe faster in consequence of the greater cold, or in consequence of taking more violent exercise. And thus we get an explanation of the fact, which we must all have experienced, that in a sharp frost our appetite is immeasurably keener than in the heat of midsummer; as well as of another fact which we have almost all experienced, how it is that in the evening after House Match we manage to make such wonderfully short work of our bread and butter.

If you have followed me in these remarks, you will see that there are three facts to account for the great quantity of animal food consumed by the Esquimaux. In the first place, the air which he breathes is much denser than ours, and therefore at every breath he inhales a greater quantity of oxygen than we do. In the second place, the coldness of the air makes him breathe quicker, and in this way he again consumes more oxygen than we. Lastly, to obtain his food he is often compelled to take many hours' violent exercise.

I have been anxious to make this explanation for fear that you should give hard names to my friend the Esquimaux; for I must tell you frankly that the most ferocious attack ever made by the most ravenous athlete on the Hall mutton or the Hall beef dwindles down into absolute insignificance when compared with the ordinary meal of an ordinary Esquimaux. I have heard of a

Marlborough Prefect (the story may be only a legend) who consumed at a single breakfast 16 eggs : but 16 eggs would only whet the outside of the appetite of an Esquimaux. He can consume with the greatest ease nine or ten pounds of meat at a meal ; and even after the heavy-armed hoplites, namely, the Esquimaux himself, is completely routed, the attack is renewed by the light-armed peltasts, namely his wife, who, while her husband lies gorged and helpless on his back, keeps on stuffing his mouth full of pieces of blubber. And you must not imagine that this consumption of eatables disqualifies him for the consumption of drinkables : quite the reverse. An Esquimaux once came on board of an English ship which had gone out for an Arctic exploration, and signified that he was thirsty. On being asked what he would have he decided in favour of rum, or as he euphemistically called it, "hot water." Having drunk ten glasses of this hot water, he detected in himself a slight tendency to walk in a circle, and asked for some cold water. Of this he promptly gulped down eleven pints, and then, declaring himself *perfectly* satisfied, got into his canoe again and paddled off to shore. Since the Esquimaux needs so much animal food, and since it is impossible for him to rear flocks and herds, it follows naturally that he must support himself by the produce of the chase. Every Esquimaux is a hunter, and their game is chiefly of four kinds, seals, walruses, reindeer, and sea birds.

The ingenuity which he displays in hunting is, like that of all savage nations, remarkable. Seals especially are extremely shy, and almost the only way in which the hunter can kill them is by watching for them at their breathing holes. The seal, being a mammal like ourselves, breathes atmospheric air, and therefore when he dives under the ice would be drowned if it were not for little holes in the ice which he makes, and to which he comes up from time to time. The hunter's dog is trained to find these holes, and as soon as one has been discovered the man builds himself a snow wall about four feet high, under the lee of which he takes his seat. He then arranges his spears and lines in such a way that he may be able to move them without making the slightest noise, and even ties his knees together to prevent the rustling of his clothes. Thus prepared, he watches for his seal with a patience absolutely inconceivable. One hunter has been known to watch a hole for two days and two nights, without sleep and without food. Even at the end of that time he was not discouraged, and after making a good meal went off to resume his post.

As soon as the hunter hears the blowing of the seal at the hole he raises his spear and drives it through the hole with all his force. He then cuts away the ice till he has enlarged the hole sufficiently, and draws out his booty.

Sometimes this seal-hunting is carried on in the open sea and the weapon which he then uses is *the* distinctive weapon of the Esquimaux, the harpoon. This harpoon is a very slight weapon: the shaft is made of bits of wood firmly lashed together, and, as wood is so scarce in many parts of the polar world, is exceedingly valuable. To the end of the shaft is fitted the head which is kept in its place by leathern thongs, so arranged that as the animal struck by the harpoon darts away, the head is detached from the shaft and acts as a real barb. The length of the head is only nine inches, the Esquimaux being anxious as little blood as possible shall escape; for all blood of animals they value highly as an epicurean luxury. Half way up the shaft of the harpoon is fixed a bladder, which serves as a float, and at the end of the harpoon is attached a long rope, which the hunter twists in a succession of coils round his neck. Thus equipped, he paddles out in his canoe and, as soon as he has come within harpoon range, he launches the weapon with his right hand, jerking off the coils of rope from his neck with the left. Should he fail to slip the rope at the exact moment, he will inevitably be dragged under the water and drowned. When the seal is struck he darts away, and the harpoon shaft with its bladder float, shows the hunter in which direction he has gone. All that is now left for him to do is to play the seal as an angler plays a salmon, till the animal is exhausted, when he paddles up and deals a death stroke with his spear.

The Esquimaux has two chief kinds of conveyance, the one for travelling by land and the other for travelling by sea. Of his boats there are two species, those used by the men and those used by the women. Like all savage races the Esquimaux regard the other sex with supreme contempt, and therefore the boat which they are allowed to use is a large clumsy vessel, called the Oomiak, flat-bottomed, with square ends, and looking much more like a skin trough than anything else. The framework is of wood and whalebone and the covering of seal-skin. It is propelled by two clumsy paddles, and steered by another paddle in the stern. But the weight which a large Oomiak will carry is very great; one, measuring 25 feet in length by eight in width, and three in depth, conveyed a freight of 20 human beings. No man would think it consistent with his dignity to row in the Oomiak, and the Esquimaux were not a little puzzled when they saw an English long boat manned by English sailors. One of them, unable to divest himself of the idea that they must be women, exclaimed in astonishment "But do *all* English women wear such *very* long beards?"

The man's canoe, or Kia as it is called by the Esquimaux, is very different. It is a light narrow frame of wood or walrus bone, about 25 feet long, in shape like a shuttle, with both ends sharply pointed, and a cover of seal skin. The materials of which it is made are so light that a man can easily carry it on his

head from his hut to the water. In the centre is a hole just large enough to admit his body, and as soon as he has taken his seat he gathers the seal skin around him and ties it tightly: this ensures him against shipping a single drop of water. These canoes have no keel and sit so lightly on the water that they fly over it, rather than through it. Indeed it is only by long practice that the Esquimaux is trained to the use of his canoe, and the skill which he displays in the management of it has been justly compared to the skill of the rope-dancer, the paddle taking the place of the balance-pole. One feat he sometimes performs to shew his command over his vessel which seems astonishing to any one who has had experience of a flat, tub-shaped English canoe. He first takes care that his waist, wrists, and neck are water tight, and then flings himself violently on one side, upsetting the kia and burying himself under water. By a powerful stroke of his paddle *while under the water* he rights himself, and comes up on the other side. A really expert canoeist will in this way "revolve" in the water (if I may use the expression) some twenty times almost as fast as the eye can follow him.

When the Esquimaux travels on land he always uses his sledge. This sledge is nothing more than two runners, made of the jaw of the whale, and connected together by a number of cross-pieces, also of bone. It is on these cross-pieces that the driver sits and the goods are packed. In this sledge the Esquimaux drives a team of dogs. The dog is the only domestic animal which the Esquimaux possesses, and though occasionally used for hunting his chief value is as a beast of burden. In his short pricked ears, thick furry coats, and bushy tail, he closely resembles the Arctic wolf. In winter the hair grows to about a length of four inches; but besides this, nature has provided him with a thick under-coating of close, soft wool, which enables him to withstand even Arctic cold. The endurance of these dogs is wonderful, for they are often kept in the open air when the temperature is from 30 to 40 below zero, are very ill fed, and are treated with great cruelty by their masters. Even M'Clintock's interpreter, a kind and humane man, seemed to fancy that they must have little or no feeling. One of his favourite theories was that you might knock an Esquimaux dog about the head with any article, however heavy, with perfect impunity to the brutes. M' Clintock upbraided him one day because he broke the handle of his whip over a dog's head, "oh," he replied, "that was nothing at all; one of his friends in Greenland found that he could beat *his* dogs over the head with a heavy hammer; it stunned them, to be sure; but by laying them with their mouths open to the wind they soon revived, got up, and ran about as if nothing had happened,"

Their intelligence is remarkable. In illustration of it Captain Hall tells a very amusing story about one of his dogs named Barbekark. He fed his team on "capelin," a small dried fish, and in order to ensure perfect im-

partiality in the distribution, he used to make the dogs stand round him in a circle and give each one a capelin in turn. But Barbekark was ingenious enough to see that if he shifted his place dodgily, he might secure more than one help at each round. As soon, therefore, as he had received his capelin, he backed out of the circle, moved down three or four places, and forced himhimself into line again. This was accompanied by a twinkle in his eye which seemed to say, "keep dark: these ignorant fellows don't know the game I'm playing, I am confoundedly hungry." Having proved to his own satisfaction that dishonesty is the best policy he improved on his first scheme by shifting his place *twice* every round, and thus getting *three* helps to every other dog's *one*. Now Captain Hall thought it time to defeat Barbekark's ingenuity: every time that it came to his turn to receive a capelin, he carefully passed him over. "Though he changed his position three times, I gave him nothing: now, if ever there was a picture of disappointed plans, of envy at others' fortunes and sorrow at a sad misfortune, it was to be found in that dog's countenance as he watched his companions receiving their allowance. Finding that he could not succeed by any change in his position, he withdrew from the circle to where I was, and came to me, crowding his way between my legs, and looked up in my face as if to say, 'I have been a very bad dog. Forgive me, and Barbekark will cheat his brother dogs no more.' I went the round three times more and then let him have the fish."

The team of dogs which draws the sledge varies from seven to ten, or even more, according to the weight. The harness is very simple, consisting of thongs of seal hide, the trace of the leading dog being considerably longer than that of the others. A team of seven dogs drew a heavy sledge, full of men, a mile in four minutes and a half. Captain Lyons was drawn the same distance by three dogs in six minutes, the weight of the sledge being 100 pounds. Several times on their return to the ships, he and his companions were brought in safety by their little steeds, though it was pitch dark and the snow was drifting all around them.

It is, however, as difficult to drive an Esquimaux team as to manage an Esquimaux canoe. For there are no reins and the driver is compelled to guide his dogs either by his voice or else by his whip. The whip is a marvellous affair, with a lash twenty-five feet long and a handle only one foot long. The difficulty of using the whip effectively is immense: for the driver must not only be able to hit any particular dog in the team, but also to accompany the blow with a resounding crack. Then comes the difficulty of getting the lash back; for it is apt to entangle itself among the dogs and lines, or to fasten itself cunningly round bits of ice, so as to drag you head over heels into the snow. Even this does not end the driver's troubles: for when an Esquimaux dog feels the whip he usually bites his

neighbour; the bite is passed along to the next, and a general fight and howling match ensues, till the driver is obliged to lay about him with a whip handle till order is restored.

The life of the Esquimaux as you will see is a life of singular monotony and hardship, and struggle for existence, and perpetual battle against the natural forces which oppress him. Hence the Esquimaux in his savage state is one of the most backward of savages. Until the Christian missions were established their language was entirely oral; they did not possess, even in the rudest form, the means of conveying a single idea, however simple, except by word of mouth. But this was not the result of lack of intelligence. A Danish antiquarian whom Dr. Hayes met with in his visit to Denmark has gathered together a very valuable collection of implements of ancient native manufacture, of which he had several hundred specimens—including knives, pots, lamps, axes, spear heads, needles, drills, and ice-hooks—all made of stone and all of superior workmanship. The knives were very sharp; so were the needles and drills; and being made of minerals, it seemed to Dr. Hayes very wonderful how they had managed to grind them down to sharp points and edges, and to polish them, as if they had possessed all the appliances of the most skilled mechanics with all the modern inventions. "I have not" (he adds) "seen anywhere so fine a private collection illustrative of the stone age of man's existence. This stone age of the Esquimaux, however, instead of having ended in a period of remote antiquity, comes down to the time when Fulton was inventing steamboats."

There is another point of view from which a peculiar interest attaches to the Esquimaux. They are one of the few savage races who have not perished at the contact with civilised man. They have proved a notable exception to the rule which philosophers have laid down that the time when barbarous races could engraft upon their own savage stock the superior culture of a high civilisation, has passed away; and that such a spectacle as was witnessed more than once before as well as after the dawn of Christianity, during the rise as well as during the fall of the Roman Empire, can never be repeated now. In a book recently published, Dr. Hayes has given an account of his personal experiences among the Esquimaux of Greenland who are under Danish rule, and who seem to have been treated by the Danish government with a practical wisdom and a singleness of purpose rare indeed in the history of imperial nations. It is true that the whole population of the Esquimaux in Greenland under Danish rule scarcely numbers 7000, not twice the number of the inhabitants of Marlborough, but anyone who has formed a right estimate of the immense gulf which separates Christianity from paganism, truth from falsehood, knowledge from ignorance, will not be disposed to look slightingly on this work because of its apparent insignificance. The Danish government has executed

its task on purely paternal principles: it has co-operated heartily with the noble and self-denying missionaries who have resigned all the world can offer for a life of toil on those bleak and lonely shores. And the result is that nowhere in Danish Greenland can be witnessed the scandalous contrast, unhappily only too common in the lands to which Anglo-Saxon enthusiasm and Anglo-Saxon enterprise have found a way, the contrast, I mean, between the heavenly doctrines preached by Christian missionaries and the devilish deeds done by their Christian fellow countrymen. Dr. Hayes went to an Esquimaux church, and was deeply impressed to see every homely, weather-beaten face upturned to the pulpit in rapt attention and every auditor hanging intently on the earnest words of the preacher. He went into the Esquimaux parliament and drew comparisons between it and the parliaments of great civilised countries which were not at all favourable to the latter. It is true that the members were seal-skin trowsers and Guernsey frocks, that their faces had seldom been touched by water, or their hair by a comb. It is true that the Parliament house, 16 feet wide by 20 long, built of nothing but boards, painted blue on the inside and plastered with pitch on the outside, would have cut a sorry figure by the side of Westminster Hall. And so no doubt the plain pine benches and the fishy odour which impregnated the atmosphere would have been highly distasteful to many honourable and right honourable members of the House of Commons. But if Dr. Hayes may be trusted, few legislative assemblies could rival in shrewd common sense and expeditiousness in the despatch of business the 13 Esquimaux administrators whom he saw. He was present at a sitting of the House. The first case was a petitioner who came in person to request assistance. His canoe had been crushed in the ice and he had a wife and children dependent on him for support. The Parliament voted him a small stipend of food and clothing to be drawn from the public store house by the wife, and paid for out of the Parliamentary funds. The man himself was sent to work in the Government blubber-house. The second case was a well-known young hunter, who had met with a terrible accident on the ice. Would they afford him relief? This was unanimously voted in the affirmative. The next question was how much? Pencil and paper were busily employed for a few minutes, and they made it out so many dollars for a new canoe, so many for harpoon and spear, so many for debts contracted at the government store house during his sickness. The third case was that of an old man who received one dollar to buy a spear with. The fourth, of an old woman who received some flannel for a shirt; the fifth, of some orphan children who received an order for bread.

I need hardly say that the Danish government draws no large revenue from its Esquimaux province, that it is tempted by no alluring bait of a vast and productive trade. To govern Danish Greenland is a very different thing

from governing British India; and it may fairly be said that there are few European states, if any, who would support colonies and maintain missions literally for nothing.

Even from this maimed and mutilated account you will see that the country in which the Esquimaux lives presents no great attractions. But patriotism, or love of one's country, or home sickness, call it what you will, is one of the most universal of human passions. We have all, I hope, read the noble lines of the Scotch poet

Breathes there a man with soul so dead
Who never to himself hath said,
This is my own my native land?
Whose heart hath ne'er within him burned
As home his footsteps he hath turned
From wandering on a foreign strand?

And even the Esquimaux clings to his ice-bound coasts with as passionate an attachment as the Scotch highlander to his foaming torrents and misty mountain tops. There is a pathetic story told of an Esquimaux, a singularly intelligent man, who had been taken to the United States, and had fully learned to appreciate the high civilization which he saw there. But he could not rest happy away from home, and nothing would satisfy him till he was taken back. On the homeward voyage he fell ill, and his strength began to sink as he drew near to his native land. When he felt the hand of death upon him he exclaimed again and again, in an eager and ever more eager whisper, "Do you see ice? do you see ice?" and with these words on his lips he fell asleep.

The following exhibitions were then made: a Window-plant (*Ouvirandra fenestralis*) and a slide containing 103 Diatoms, by E. F. im Thurn, Esq.

Tracings of sketches taken in the Arctic expeditions, presented by M. A. Chilton.

A fine specimen of stalactitic iron from the Forest of Dean, presented by the Clifton College Scientific Society.

A diagram illustrating the origin of the Union Jack, by the President, and "Wood's British Beetles," presented by W. M. H. Milner.

Lists of ornithological and entomological notices were passed round.

There were 46 persons present: 5 hon. mem., 22 mem., 2 assoc., 17 visitors.

MEETING HELD APRIL 29TH, 1872.

The President announced that F. T. Hoffmann was elected a member, and that a Field-day would probably be held on May 9th in the neighbourhood of Pewsey.

A. C. Champneys read the following paper, illustrated by diagrams by F. E. Hulme, Esq., F.L.S., on

VESUVIUS.

THERE is probably no volcano in the world which has such an interesting history as Mount Vesuvius, since we have a full account of it as a wholly extinct, a partially extinct, and an active volcano. For Vesuvius was not always a mountain subject to frequent eruptions as it is now. This part of Campania was then probably more like parts of Auvergne, which are subject to occasional earthquakes, and contain many inactive volcanoes of just the kind that Vesuvius was when we first hear of it. From the dawn of History down to the 1st century after Christ, though we hear of frequent eruptions of Ætna, we hear of Vesuvius only as covered with vines, and famed for the fertility of its soil. There was however a tradition extant in the time of Diodorus Siculus who lived just before the Christian era, that Vesuvius had been active and poured rivers of lava upon the country round. And this is confirmed by the fact that Pompeii itself is built on lava. But this time had long past; Vesuvius had long been quiet, and we must try to think of it at this time as a mountain with two summits containing a crater with its sides strewn with rocks, ashes, and pumice-stone thrown out by former eruptions, amidst which grew not a few trees. Its sides, fertilised by the decomposed ashes, were green with vines, which also grew all around its foot. Around it stretched fertile plains dotted with villas, and between it and the sea stood Herculaneum and Pompeii.

When the gladiator Spartacus, with the slaves he had collected, was pressed by the Prætor Clodius, he took refuge in the crater, and unexpectedly sallying from this inaccessible retreat, defeated him. So much for the history of Vesuvius as an extinct volcano. We must now look at the signs of the coming storm.

Shortly before the time at which the first eruption occurred a magistrate of Pompeii was struck dead by lightning, though the sky was clear, and there were no signs of a storm. This was doubtless really owing to volcanic action, though the exact way in which it happened would be hard to find. About a year before the final catastrophe both Pompeii and Herculaneum were in great measure destroyed by an earthquake. Pompeii had not quite been restored by the time of the eruption, and in some places the tools of the workmen

who were re-building have been found. The alarm caused by it had not subsided when the worse destruction fell on these cities.

We have a full account of this eruption of Vesuvius in the letter of the younger Pliny in which he describes the death of his uncle the elder Pliny. The elder Pliny was at the time in command of the fleet at Misenum, about 10 miles from Vesuvius. There had been shocks of earthquake for some days before, but in Campania this excited no alarm. On the 24th of August about mid-day a cloud was seen in the air in the form of a tree, that is to say, rising perpendicularly into the air, and then spreading out. Pliny determined to go and get a closer view, so embarking in a light vessel, he made for the point where the cloud was. I shall quote the description given in his nephew's letter.

"He was now so nigh the mountain, that the cinders, which grew thicker and hotter the nearer he approached, fell into the ships, together with pumice-stones and black pieces of burning rock: they were likewise in danger not only of going aground by the sudden retreat of the sea, but also from the vast fragments which rolled down from the mountains and obstructed all the shore."

At Stabia where he had gone to assist a friend, he went to bed in his house, but was soon obliged to get up as the court was becoming filled with ashes and stones and he would have been unable to get out in a little while. So he and his friends went out into the fields, for the earthquake was so violent that these seemed the safest place, tying pillows over their heads to guard them against the falling stones. The darkness was more intense than that of midnight, only broken by the flames which burst from Vesuvius, and the light of the villages set on fire by the burning stones that fell. The party wandered down to the shore, and here Pliny suddenly fell down dead, suffocated no doubt by some vapour that broke out from the earth. Such was the state of things at Stabia, 6 miles from Vesuvius, what must it have been at Pompeii or Herculaneum at its very foot! Let us now see what was happening at Misenum, which we learn from a letter of the younger Pliny, who was present during the whole of what he relates. He was awoke by a tremendous earthquake, which alarmed even the Campanians used as they were to them. When morning broke, the light was dim; buildings were seen tottering on all sides; chariots were rolled backwards and forwards by the shocks. The sea rolled back and left fish and other sea-animals struggling on the shore. On the land side a huge black cloud hung gleaming with fire, and constantly darting out flashes of lightning. Soon the cloud descended, and ashes began to fall. Then suddenly a torrent of smoke rolled upon the crowd assembled clear of the buildings, and it grew darker than the blackest night. "Nothing then was to be heard but the shrieks of women, the screams of children and the cries of men; some calling for their children, others for their parents,

others for their husbands, and only distinguishing each other by their voices; some wishing to die, from the very fear of dying; some lifting their hands to the gods; but the greater part imagining that the last and eternal night was come, which was to destroy both the gods and the world together."

Then suddenly flames burst forth, to be succeeded by blacker darkness, and the ashes fell thicker; at last the darkness gradually cleared off, and the sun appeared, looking sickly as in an eclipse. Everything was covered with ashes, that looked like snow; the whole country was white. Such is the account which we possess of this eruption; how many perished in it is not known; but probably no very great number as but few skeletons have been found in Pompeii.

In this eruption, as you all know, perished Pompeii and Herculaneum, and so we owe to it the greater part of what we know of the arrangements of a Roman city, and a Roman house. Herculaneum was destroyed by a stream of lava, and buried from 60 to 112 feet deep and on account of the hardness of this when cooled its excavation is difficult. But a large part of Pompeii has been exposed; the Forum, two theatres, an Amphitheatre, several temples, and many small articles have been found of the greatest interest, loaves of bread in a baker's shop, dice (some of them loaded) tickets of admission to the theatre, besides bronze and other statues. But there is no time here to give an account of the discoveries at Pompeii, which would give material for more than one paper.

After the mountain once broke out, eruptions occurred frequently; during one in 471 the whole surface of Europe was covered with a fine powder, and the ashes reached to Constantinople, and caused great alarm there.

In 512 the whole of the country was covered with ashes reaching in some places to the top of the trees. So great was the destruction that all the taxes of Campania had to be remitted.

There were several eruptions about the 10th century, connected with which are some stories which illustrate the mediæval belief that Volcanoes were the mouth of hell; St. Peter Damiani writes that,

"In the neighbourhood of the mountain dwelt a most devout hermit, who one evening seeing upon the road a quantity of black men, apparently negroes, driving in haste before them a great number of mules loaded with fuel, accosted them, expressing surprise at the singularity of their appearance. They replied that they were all devils, that the fuel was to burn the Prince of Capua who was then ill; and they added that Don Juan, Constable of Naples, although in good health, would, if they were not mistaken, soon be in their power.

The holy man, giving up the cause of the Prince as hopeless, immediately betook himself to the Constable; told him all he had seen and heard, and

exhorted him, as the only way of avoiding this disagreeable alternative, to become a monk. To this Don Juan was easily persuaded, since upon enquiry he found that in the meanwhile the Prince had expired: but, as he had received orders to join the Emperor Otho, who was expected in a fortnight, for the purpose of driving the Saracens out of Calabria, he deferred the execution of his pious resolution till the infidels were conquered; the consequence was that he died before the Emperor arrived; and at the moment of his death Vesuvius burst forth into dreadful flames, bellowing from a mouth whence fire everlastingly issues; which fire always flames with greater vehemence pouring out rivers of rosin and brimstone whenever any rich and consequently wicked man dies."

It was also considered the outlet of Purgatory. The same Saint tells us that a man he knew, who was chaplain to a great bishop, was proceeding to Naples leaving his mother infirm at Beneventum, when he saw Vesuvius shoot forth a great body of flames, and from the midst came a dismal voice which he recognised as his mother's, and he afterwards found the time to agree exactly with the time of her death.

From this time the mountain seems to have become less active; the eruptions were less frequent and violent, and after the eruption of 1538, the mountain became wholly extinct for a time.

We have an account of the state of the mountain in the 16th century. A certain Pighi describes it as a vast amphitheatre, with a bank of calcined stones round the top, the summits partially covered with trees. He went down by a winding path for nearly a mile. Here the path became blocked with huge rocks and trees, and it was so dark as to make further progress dangerous. No sign of Volcanic action was discovered, except a slight heat in the fissures near the top. He was told that it was possible to descend two miles and that at the bottom was a flat space set round with caverns. In 1619 another Italian named Magliocco, made his way down the side of the crater, till the path was blocked by a huge rock. He was then obliged to go on hands and knees, and thus succeeded in reaching the bottom. It was level, and in the middle was a large rock, probably covering the entrance to the abyss, from the fissures around which came a strong current of cold air. There were three small pools of water, one very bitter, one very salt, and one very hot and insipid.

In 1631 the Volcano broke out with a tremendous eruption. After this time Vesuvius was never quiet for long together and eruption quickly succeeded eruption.

During an eruption that occurred in 1766 the lava did not burst out from the top, but from a fresh vent in the side of the mountain, while all the ground around quivered. The eruption of 1794 was portended by a scarcity of water

in the wells, and occasionally by puffs of smoke issuing from the ground. These phenomena are not unusual before an eruption. The Volcano commenced by throwing jets of flame into the air; a rift opened in the side of the mountain from which a huge stream of lava poured down upon the town of Torre del Greco. This place had often been threatened before, and a great part had been destroyed in 1631. On this occasion the blood of St. Januarius was brought out to check the torrent, but it failed to do so. The lava buried the town and rolled on to the sea. Out of 18,000 only 15 people perished. This is to be attributed to the nature of lava. It pours with great violence from the crater, but its rapidity quickly diminishes, and the top very soon begins to cool, though it is a very long time before the whole cools; for instance, a stick was lighted by being thrust into a crevice of the lava three years after an eruption. Thus many people could escape over the cooling and hardening portions and the ashes resting on the top. In this way at Torre del Greco a fire-work maker saved his gunpowder; the lava surrounded his house but did not enter it. Torre del Greco was re-built on the lava, to be again destroyed by a future eruption.

By the eruption of 1822 a great change was made in the crater. Scarcely any trace had been left of the old crater, its walls had been thrown down in many places and what remained of it had been filled up till it was a level plain. In 1822 a great cleft was made in this, the depth of which was estimated at 2000 feet. This in its turn was soon filled up by the ashes, rocks, and lava that the crater poured out. In this eruption so much of the cone that, rising from the old crater, formed the mouth of the Volcano, was blown away, that the mountain was reduced from 4200 to 3400 feet.

In the eruption of 1861 a number of small cones opened at the foot of the mountain, and Torre del Greco was again almost destroyed by streams of lava.

The last eruption occurred in 1868. On this occasion the cloud that hung over the mountain looked like a huge tree, as it did in the eruption described by Pliny. When Vesuvius became quiet, an eruption of Etna commenced, shewing the intimate connection between the two mountains. I could have wished to quote to you an account of an eye-witness of an eruption, but except that of Pliny I have been unable to find one short enough. I will therefore try to tell you as well as I can what an eruption is like from the accounts of those who have witnessed it.

As you ascend the mountain you may be scarcely aware of what is going on. But when you arive at the top, there at once you look down into a vast bowl full of liquid fire, and stones white, orange, red with heat. Then suddenly you hear an explosion, and a shower of white-hot rocks and ashes is thrown high into the air. The ground is hot at the top, burning a foot or two

below, as you can see through the chinks; while from numberless crevices issue jets of sulphurous vapour, which collecting hang overhead in a white cloud. The lava seldom or never overflows the crater, but bursts through its sides.

This applies to the lesser eruptions, for no one could have witnessed such an eruption as destroyed Pompeii close by, and lived.

I will now conclude, hoping in a future paper to give you some account of Pompeii.

A. C. Champneys exhibited some Roman tiles from the catacombs at Syracuse.

There were 26 persons present: 2 hon. mem., 19 mem., and 5 visitors.

MEETING HELD MAY 11TH, 1872.

The President announced that L. W. Toms and D. E. Olivier had resigned owing to stress of work; that W. H. Williams had been elected a Member, T. N. H. Smith an Associate, and Capt. R. B. Reed an Honorary Member.

F. J. H. Jenkinson then read a paper on

SHELLS.

In choosing this subject for my paper to-night, I have been influenced mainly by a desire to offer some hints to those who intend to collect shells this year for the Stanton Prize. But extensive as the subject might be, even if I confined myself to land and freshwater shells alone, I think it will be more interesting to the majority of my hearers to notice briefly the divisions and more important kinds of marine species as well. I intend to confine my remarks entirely to British shells, properly so called: while I shall take no notice of the numerous species of Mollusca which have no shell at all.

The broadest division is into Bivalves and Univalves, terms which explain themselves. The former have two shells or valves, joined together by a kind of hinge, with a strong ligature; Cockles, Scallops, Mussels, and Oysters belong to this division. Univalves have the shell all in one piece, generally of a more or less spiral form. Under this head are included Limpets, Winkles, Whelks, and the numerous kinds of snails, as well as many others less universally known.

This division is based on the character of the shell with its essential parts as a whole, and is as true with regard to the character and organization of the animal, as it is by hypothesis with regard to the shell. So obvious a line of demarcation could not fail to be appreciated by the earliest concho-

logists, and accordingly all systems, even the very rudest, agree in adopting it. Some, however, guided by a mere external form, added a third class, called Multivalves, where the shell consisted of several pieces joined together. This division contained some which more scientific arrangements have placed among Bivalves, some Univalves, and some which are not Molluscs at all. Thus the Chitons, a genus of small shells in appearance closely resembling woodlice, and like them jointed in segments, but in structure and habits nearly allied to the Limpets; the common barnacles, which everybody has seen with their long, black stalks, and beautiful white shells and feathery tentacles, hanging in hundreds to bottles and pieces of timber that have been long floating at sea, but which are, however, not shells properly so called; these and several others were huddled into the class Multivalves.

The minor classifications into families, genera, and species, are not nearly so uniform and unvarying. The principles which have been followed by different conchologists are twofold. Turton and many older classifiers are guided almost entirely in the arrangement of the Bivalves, by the number and size of the teeth which form the hinge connecting the valves. This method has the advantage of being quite as readily applicable to dead shells, as to perfect specimens which have the animal alive in them. But it is very unscientific: it brought together animals the most widely different, into the same genus, simply because the joining of their shells was the same; while little regard was paid to the size and shape of the shell.

Modern conchologists are guided almost entirely by the structure of the animal. They are thus enabled to apply the same method to Bivalves, Univalves and naked Mollusca and to present them to our view arranged in an unbroken series, and forming one congruous and definite step in the arrangement of the animal kingdom. The Univalves show a higher organization than the Bivalves; the common snail would be pronounced even by a casual observer to surpass in the development and perfection of its parts such lethargic creatures as the mussel and the oyster. Indeed, but few Bivalves are capable of voluntary motion: a few, as the scallop, can progress through the water by ejecting water with considerable violence in the opposite direction: while many, and especially the *Solens* or Razorfish, can pass down into the sand with such rapidity, that it is very difficult to follow fast enough to catch them.

Univalves, on the contrary, can all walk about at their leisure—with the exception of the Limpet, which forms a curious anomaly and is indeed proverbial for its stationary life. They have eyes, by which they direct their course with more purpose than their blind relatives; they have powerful olfactory nerves, or, if not, some nearly allied sense, which gathers them round a carcase or other bait in a wonderfully short space of time; they have, some

of them at least, a remarkably sharp tongue, with which they drill a minute round hole in the shell of a helpless bivalve, and then suck out at their leisure the juicy contents. One species in particular, *Purpura lapillus*, very abundant on all our shores, drills and devastates whole beds of mussels: and I remember reading an account of some lighthouse on the south coast, where mussels had been planted abundantly in order to bind the rock and lighthouse together: the *Purpura* soon made its appearance and completely cleared them off. This same shell is interesting in another way, as it is believed to be the same from which the Phœnicians extracted the famous Tyrian purple. Its appearance is not very prepossessing, the shell being dull white, in form somewhat resembling a common periwinkle, but exceedingly thick and solid, and more pointed at the bottom.

While on the subject of the locomotive powers of univalves, I may refer to certain other inhabitants of univalve shells, whose powers of progression are far more considerable. These are the unlawful occupiers of the shell, so familiar to everyone who has rambled among the pools and rocks, left by a low spring-tide, and known variously as soldier-crabs and hermit-crabs. The former name they have received from their pugnacious, the latter from their solitary habits. Their construction is very curious, being that of an ordinary crustacean distorted so as to suit the peculiar circumstances of their life: the hinder part of the body, like that of the rightful inhabitant whom he has ousted, is soft and pulpy, tapering so as to fit into the spiral shell; while in front he is protected by a complete coat-of-mail resembling that of a lobster or crab, and, to make everything still more secure, one of the two claws with which he is armed is enormously exaggerated, and large enough to fill the whole entrance to the shell, and form a barricade which his enemies cannot assault with success or even with impunity. He is of course unable to live always in one shell, so when he feels he is growing too big for the one he occupies, he fights his way into a more commodious home, there to remain for a season and in due time to move on again.

The genus *Pholas* is a very interesting group, the commoner species of which may be studied on many parts of our coasts. When a colony of them settle on any rock, they immediately begin to burrow into it with as much ease as rabbits in a warren, traversing it in all directions, and boring without hesitation through any of their own species which may happen to cross their path. The mode of operation is still uncertain, some believing that they rasp away the stone by a circular motion of the shell, which is very like a cylindrical file, while others suppose some fluid to be secreted which eats away the rock before them. Whether the means be mechanical or chemical, the effect is undeniable; in time the rock, honeycombed in all directions, is broken by the waves, and the fragments reduced to sand: the mollusos pursue their

operations still further, the wave again washes off the protecting stone behind and so the process continues alternately, silently and slowly destroying large portions of the coast.

Destructive as is the *Pholas* in its way, its ravages are not nearly so serious to mankind as are those of another mollusc, the *Teredo*, or ship-worm, which is probably the cause of many of those mysterious shipwrecks which are known only by the disappearance of their unhappy victims. The young *Teredo* floats about until he meets with a vessel to his liking, then he immediately attaches himself to it, and proceeds to bore a passage right into the wooden frame, lining his tube with a calcareous covering, and gradually increasing the size as it advances, to suit his own growing dimensions. Just as the *Pholas* assists the waves in the destruction of rocks, so the *Teredo*, working silently and unseen beneath the waterline, occasions inevitably, sooner or later, the foundering of the vessel on which he has fixed.

A very fair collection of the commoner shells may be found by merely walking along the shore, and picking up what the tide has thrown high upon the beach. A lazy collector is thus saved the trouble of extracting the live animal, or, as I have heard it called by natives of the beach, the 'meat'; but he also rarely gets his specimens in such perfect condition as the more energetic shell-hunter: his bivalves generally show but one valve, not unfrequently drilled by the *Purpura*, while his univalves have lost all their angles and frequently the greater part of their colour and markings.

Far different is the plan pursued by the collector who wishes to show his shells as they were when the animal was alive inside them. To do this it is necessary to seek them in their native haunts, some buried in the sand left bare by the low spring tides, some under large stones which require hard work to move them, some in the corallines that fringe the rock-pools, while some have to be drawn up from various depths where they lie at the bottom of the ocean.

The stones and corallines require mere searching, careful searching however, as most of the species that live among them are small, while some are exceedingly minute. The sight that meets one's view on turning over one of these large stones is quite unique. There is a general scuttle of crabs and small eel-like fish which the fishermen call gundles, all making for some corner to hide in: and when they have departed, it is time to examine the less active inhabitants. The under surface of the stone is sure to be covered with three or four kinds of Zoophytes, pink, green, red, white, yellow, which resemble a volcanic surface of craters, from each of which, when the tide is up, there protrudes a little feathery occupant of some bright colour. To preserve these in their natural condition microscopists have adopted a singular expedient: they put the Zoophyte into water, when it soon puts out

feathery tentacles: as soon as it has expended, they drop in gradually some intoxicating liquor, under the influence of which the animal by degrees loses its senses, without being sufficiently alarmed to make it retreat: it is then transferred to the slide and enclosed in the cell its final resting-place in all the beauty of life. To return from this digression. Lying close to the surface of the newly overturned stone, numerous little flat crabs, whose upper surface is of a dingy brown, while the white, china-like appearance of the under side has gained them the name of Porcelain-crabs. After noticing these various animals, we begin to look for the objects of our search, the shells. They are, as I have said, all small species, mostly minute screws or spirals, as they are called, of many different kinds. A small bottle is the best thing to put them in, and if this is not at hand, an old tin cap-box.

The other most important way of procuring shells alive is by dredging. The dredge is a large bag of close mesh with an oblong mouth of flat iron to the ends of which are attached the handles for making fast the rope. This is let down from a boat to the bottom of the sea and dragged along the surface of the sand: the iron edge scoops up a shaving of the bottom, which is held in the bag: and when it is full, the dredge is hauled up by two or three men, and its contents turned out on a sail to be examined. No one who has not seen it would believe what a quantity of creatures of all kinds may be observed in one haul; crabs, shells, star-fish, and even small fish form the greater portion of the inhabitants; and the shells we find here are almost entirely unknown on the beach. By the time one haul is examined, another is ready, and so you may spend as much time as you like. Only, for the amusement you require a sailing boat and a breeze, as a rowing boat could not pull the dredge along the bottom, and you must be proof against sea sickness, for the dredge acts almost like an ancher, and impedes the motion, so that the boat strains and rocks most uncomfortably.

So much then for the collection of sea shells, which would easily fill as much space as could be given to the subject. I will now make a few remarks on Land and Freshwater Shells, which ought to possess a closer interest for us who are so far from the sea and its more gay and varied attractions. Of course the search for them involves less trouble than dredging and turning over large stones; but still there is enough variety to make them a very interesting study. Land-shells are found in all sorts of situations, dry and wet, sheltered and exposed: but I may mention as prolific localities, the moss on tree-trunks for the genus Pupa and some other small species, as *Cyclostoma elegans*, which I have found in the copse above Preshute commonly enough, while many may be found under stones, loose bark, etc. Those who collect for the Stanton Prize may care to know that Slugs are *bonâ fide* shells, as much as Snails: and, by putting one in boiling water and

afterwards carefully opening the back with a sharp knife, a shield will be found, varying in size according to the species, and bearing a close resemblance to some marine species of the genus Pleurobranchus.

Fresh-water shells may be found wherever there is clear water: reservoirs, canals, streams, etc., may all be searched with success; and mole-hills in low meadows often show small species that have been left by floods. But particular directions to find them are superfluous and indeed impossible, because, as I have said, wherever the water is, there are the shells.

I have not troubled my hearers with names and technical terms, because they are meaningless to the beginner, and only discourage him. The shells must be found first, and books used only with them by the side. Finally, I must apologise for the crude and unconnected form of this paper; but I must plead as my excuse the press of work which deferred its composition to the last moment, and my inability to refer to any work on the subject for anecdotes and other usual ornaments of a paper.

A. C. Champneys exhibited three rubbings of Brasses from St. Alban's, one of a monk, showing his monastic habit; one a fragment of the effigy of an abbot, with very beautifully-worked vestments; and a very large one of a mitred abbot, Thomas Ramrugge, the last before Cardinal Wolsey, with figures of Saints round, and at the top, Christ enthroned, with angels censing. He then spoke about the Abbey, and gave an account of the Rood-loft, *à propos* of a fragment seen on the field-day in Pewsey Church.

E. Meyrick then passed round a List of Notices, over 50 in number, taken during the past three weeks, among which were eight species new to the College List.

The President passed round a List of Ornithological Notices, and exhibited a Peregrine Falcon, shot at Collingbourne Ducis, early in March, and an Australian Pigeon, presented by N. Whiting.

He also exhibited a specimen of *Marchantia polymorpha*, and made a few remarks upon its fructification.

There were 27 persons present, 2 Hon. Members, 20 Members, and 5 Visitors.

MEETING HELD MAY 31st, 1872.

G. F. Rodwell, Esq., F.R.A.S., F.C.S., read the following paper illustrated by experiments, on

THERMO-ELECTRICITY AND A NEW THERMO-ELECTRIC BATTERY.

VOLTA, professor of Natural Philosophy at Pavia, was the first to construct an instrument for the production of *current electricity*. By current electricity I mean electricity which is always moving, as opposed to static or frictional electricity, which remains on the surface of the body from which it is generated, until it is connected by means of a conductor with some other conductor. Current electricity is sometimes called Galvanic electricity, sometimes Voltaic electricity, sometimes Dynamic electricity. The science which treats of this form of electrical action dates from the year 1800, when Volta invented his so-called Voltaic Pile. The principle of this instrument you will easily understand: suppose a vessel partially filled with dilute sulphuric acid; if we now immerse in the liquid a plate of copper and a plate of zinc, the copper is found to possess a feeble charge of positive electricity (+), while the zinc possesses a feeble charge of negative electricity (—), and if they be connected by means of a wire the two plates becomes instantly discharged, and the positive and negative electricities neutralise each other, but the electrical condition of the plates is instantly restored, and as instantly the two electricities flow together again through the wire. These successive charges and discharges take place with such extreme rapidity that they are practically continous, and the wire conveys an electric current. Now this connecting wire is found to possess several very remarkable properties. If it be divided and the ends be introduced into water, so that the water forms part of the circuit connecting the zinc and copper plates, the water is decomposed; the atoms of oxygen and hydrogen which compose it are forcibly torn asunder, although strongly united by the force of chemical affinity. Again if the free ends of the wires, the one conveying positive electricity, the other negative, be connected by means of a very thin wire of some badly conducting substance such as platinum, the current meets with resistance and generates *heat*, and we notice the intense ignition and ultimate fusion of the wire.

In 1819 Oërsted, a Danish Natural Philosopher, discovered that if an electric current is allowed to flow above or below a suspended magnetic needle the latter is deflected from the north and south position which the magnetism of the earth compels it to assume, and that it sets itself at right angles to the direction of the electric current. By this experiment magnetism and electricity became associated in the closest manner, and the new science of electro-magnetism soon arose under the auspices of Ampère and Faraday. It was found that the deflection of a magnetised needle afforded a test of extreme delicacy for the presence of an electric current, and the sciences of

electricity and magnetism both became considerable gainers by the discovery. This experiment is the basis of electric telegraphy.

In 1821 Professor Seebeck of Berlin found that by heating one of the junctions of a rectangle composed of two different metals soldered together, an electric current was produced. The production of electricity by heat was called *Thermo-electricity*, and the electricity produced the *thermo-electric current*. The current was found to flow from the warmer through the colder junction and by placing a freely suspended magnetic needle within the rectangle, and arranging the system in the magnetic meridian the existence of the current was easily rendered evident by the deflection of the needle. The metals which are best adapted for the production of thermo-electricity are bismuth and antimony, but bismuth and copper, or bismuth and iron also form very effective couples. Alloys are sometimes used with much advantage.

The cause of the production of electricity by heat is altogether unknown. Becquerel has proved that it neither results from contact, nor from chemical action, and he attributes it to the unequal production of heat in different parts of the compound bar of metal. It has been found indeed that a thermo-electric current may be produced by heating one metal, if it be not homogeneous, that is of the same nature as to aggregation or texture throughout. Thus if a piece of copper wire be coiled into a helix and if heat be applied to one side of it an electric current is produced.

Again Svanberg has found that a thermo-electric couple may be composed of two pieces of bismuth, provided that their crystalline structure be different.

If cold be applied to the junction of any two dissimilar metals, a thermo-electric current is also developed in the opposite direction to that which would be developed if the same junction were heated. (By the *direction* of an electric current is always understood the direction in which the positive electricity flows.) It is obvious that if we cool one of two junctions of dissimilar metals, it amounts in effect to warming the other junction, and the greater the difference of temperature between the two, the greater within certain limits will be the electric current produced.

If instead of taking a single pair of metallic rods or plates we multiply them, we of course obtain a much greater thermo-electric effect. Hence the *thermo-electric battery*, an instrument first devised by Nobili, and consisting of a number of rods of two different metals—generally bismuth and antimony, —with their alternate ends in contact.

Thus the first antimony would be soldered to a bar of bismuth, and the free end of this to a second bar of antimony and so on, and by arranging all these bars in a compact cubical form it is obvious that a large number of couples can be brought into a very small space. Then if the last bismuth and the first antimony be connected by means of a wire an electric current will flow

from the antimony to the bismuth. Such an instrument becomes an extremely accurate measurer of minute amounts of heat, and as such it was first used by Melloni and Forbes, and has since been largely employed by Tyndall in his researches on radiant heat. The least difference of temperature between the opposite faces of the *thermo-pile* (as it is called) generates an electric current, which can be made evident by the galvanometer, an instrument based on Oërsted's discovery to which I have alluded above. I have here a thermo-pile consisting of bars of bismuth and antimony arranged in the form of a cube; we will place it in connection with this galvanometer, and you will notice that if I approach my hand to the face of the pile the needle swings in one direction, while if I cool this same face of the pile by ether (which evaporates very rapidly and in so doing absorbs heat from surrounding objects), an electric current is generated moving in the opposite direction, and the needle now swings round in a direction opposite to that of its first movement.

But our object this evening is rather to discuss an instrument by means of which a large quantity of electricity may be produced by an unlimited amount of heat, than to show how a very small and limited quantity of heat can be made evident by the electric current which it generates. If we use large bars of antimony and bismuth, place together a large number, cool one face of the battery by ice, and heat the other by the radiation from a red-hot sheet of iron, powerful electrical effects may be produced, water may be decomposed, an electro-magnet may be excited, and an induction coil may be worked. Such batteries are however cumbrous and troublesome to work, and are never used for any of the ordinary purposes for which current electricity is required, because the Voltaic battery is more convenient. Many attempts have been made to construct powerful thermo-electric batteries: M. Marcus constructed a battery in which two alloys were used: the positive metal consisting of

10 parts of copper
6 „ „ zinc
6 „ „ nickel

And the negative of

12 parts of antimony
5 „ „ zinc
1 „ „ bismuth.

These could be heated to a high temperature without danger to the battery.

One of the most powerful batteries yet constructed is that of M. Becquerel, which consists of alternate bars of sulphide of copper and German silver. The sulphide of copper becomes powerfully positive when heated to between 200° and 300° C. The bars of sulphide were 4 inches long (10 centimetres), by ½ of an inch broad (18 millimetres), and ½ an inch (12 m.m.) thick; they were con-

nected with plates of German silver, and were heated by gas, while the opposite extremities were cooled by a constant stream of water.

For a length of time we had heard but little of thermo-electricity, until a few months ago a paper appeared in Poggendorff's *Annalen*, describing a powerful thermo-electro battery recently invented by Franz Noë of Vienna. It is this which I wish to describe to you this evening. It differs in several respects from the batteries described above: firstly the bars of different metals composing it are very small, but powerful, so that the battery is stronger for its size than perhaps any battery hitherto constructed. Secondly the elements are cooled by radiation: broad pieces of blackened copper are attached to the faces of the elements which it is desired to cool, while the heating is effected by gas flames issuing from small Bunsen batteries, which flames directly impinge upon the elements. The metals are both alloys: the one an alloy resembling German silver, the other a very crystalline alloy, undoubtedly containing a good deal of bismuth. The composition of both these alloys is kept secret by the inventor. The positive element is cast into small cylinders while in the form of wire, and is soldered to the positive element; the insulation being effected by small pieces of mica.

So much for the construction of the battery, now for its effects. It is difficult to know to what extent one may safely heat the elements; as the nature of the alloys is unknown it is impossible to form any idea of their fusing point. However, with an amount of heat which is quite insufficient to raise the copper cylinders enclosing the negative alloy to faint redness, the following effects may be observed.

1. Two inches (51 m.m.) of fine platinum wire may be raised to redness.
2. Water may be decomposed at the rate of 26 cubic centimetres per minute, (10 c. c. = 0·610271 cubic inch.)
3. A small ill-made electro-magnet may be made to carry 30 lbs. (1000 grammes = 2·2046213 lbs. Avd.)
4. A Rhumkorff's coil giving a spark 14 m.m. long may be worked.

In fact this battery may be applied to all the uses for which a Voltaic battery is used, and by multiplying the number, even the electric light could be produced. This consists of 80 pairs of elements which are heated by eighty small Bunsen burners. Its power is said to be equal to that of "8 large Daniell's elements," but the dimensions are not given. It has been proved however by exact means, that one of these elements is eleven times as strong as a bismuth-antimony couple of the same dimensions; and it would appear to be about equal to one of Becquerel's sulphide of copper and German silver elements of far greater dimensions, as I have mentioned above. The battery is very effective for all ordinary lecture table experiments; whether electrical, magnetical, chemical, or thermal properties of the current have to be shown,

and it possesses a great advantage over the Voltaic battery, inasmuch as here we have only to turn on gas to produce an electric current, while in that case we must have strong acids and amalgamated zinc plates, and have the constant trouble of changing the acids, renewing, or re-amalgamating the zinc plates, and so on. Now that a really powerful and compact thermo-electric battery has been produced, I think the time is not far distant when such an instrument will entirely replace the Voltaic battery for lecture purposes, if not indeed for telegraphic purposes.

We have in the thermo-electric battery an admirable example of the transmutation of one force, or energy, into another. If it be not to "consider too curiously" let us trace the changes of energy which take place here. We start with the force of *chemical affinity* which causes the molecules of oxygen and of coal gas to rush together at the orifice of the burners; they collide, their motion of translation is converted into motion of vibration, in other words into *heat*. Heat acting upon the dissimilar alloys is changed into *electricity*; if this electric current be passed through a thin platinum wire it produces both *light* and *heat*, for the wire glows with what we call a red heat; if the current be circulated around an iron bar we have the production of *magnetism*, if it be allowed to flow through any form of electro-magnetic machine, we have both magnetism and *motion*, and if we retard this motion we may again get heat, or if we please static electricity. And thus the full cycle of changes may be accomplished, and the changes of energy which take place here do but typify the mightier changes which take place in the Universe. For there too, a force, an energy, is never at rest: it is incessantly changing its condition, and the phenomena of Nature are but the exponents, the proofs, the visible signs, of these transmutations.

There was no time for exhibitions. There were 81 persons present: viz., 3 Hon. Members, 29 Members, 2 Associates, and 47 Visitors; 21 of the visitors being admitted by the Committee, according to the rule made to meet such cases.

MEETING HELD JUNE 14TH, 1872.

M. A. Chilton read a paper on the "Antarctic Regions."

The Heads of sections gave their Reports and E. Meyrick passed round a very long list of notices.

After a few remarks from the President on the general state of the Society, the following were elected as officers for the ensuing Half-year:—*Committee:* A. Babington, Esq., C. E. Vaughan, F. W. Giles, and H. M. Hamilton. *Secretary*, C. E. Vaughan. *Librarian and Curator*, W. D. Steele. *Sub-Treasurer*, G. C. Mansel.

There were 29 persons present, 1 Hon. Mem, 20 Mem., and 8 Visitors.

During the half-year there were 9 meetings, the average attendance being 39—2.

Honorary Members.....	2—3	Members	20—5
Associates.....	0—6	Visitors,,.	15—6.

ENTOMOLOGICAL LIST.

In the present Report an attempt has been made to get up a list of the Tortrices and Tineæ, which has long been a desideratum, as it is very difficult to find anyone who takes an interest in them. The absence of some species which ought to have been observed by this time, may be explained by the backwardness of the season.

It seems necessary to explain that *Procris Statices* (the Green Forester) must be erased from our lists for the present, the species which has hitherto received that name here being *P. Geryon*.

Those marked † are new to the district. As no previous list of the Tortrices and Tineæ has been published, none are marked among those divisions; *A. Decemguttella* is perhaps the most worthy of notice. When the date of an insect's capture is considerably posterior to that on which it was bred, both are noticed.

Names of those whose initials occur in the following list:—

J.W.D.	J. W. Dudding
S.F.	S. Featherstone, Esq.
F.W.G.	F. W. Giles
F.E.H.	F. E. Hulme, Esq.
E.H.	E. Hunter
F.J.H.J.	F. J. H. Jenkinson
J.B.K.	J. B. Keyworth
W.H.S.L.	W. H. S. Laxton
J.H.W.L.	J. H. W. Lee
F.P.L.	F. P. Lefroy
G.W.L.	Rev. G. W. de Lisle
G.C.M.	G. C. Mansel
W.M.	W. Mansel, Esq.
E.M.	E. Meyrick
C.S.P.	C. S. Peach
H.S.P.	H. S. Philpot
T.A.P.	Rev. T. A. Preston
W.F.R.	W. F. Rogers
G.J.S.	G. J. Scott
A.H.G.S.	A. H. G. Skrine
H.J.C.S.	H. J. C. Smelt
S.D.S.	S. D. Smith
J.S.	Rev. J. Sowerby

RHOPALOCERA.

Gonepteryx Rhamni	Brimstone	Mar. 4,	F.P.L.
Pieris Brassicæ	Large White	Mar. 4,	F.E.H.
P. Rapæ	Small White	Apr. 10,	J.W.D.
P. Napi	Green-veined White ...	Apr. 10,	E.M.
Anthocharis Cardamines ...	Orange-tip	May 9,	T.A.P.
Lasiommata Megæra	Wall	May 16,	S.F.
Hipparchia Janira	Meadow Brown	Jun. 16,	F.J.H.J.
Cœnonympha Pamphilus ...	Small Heath	May 24,	E.H.
Cynthia Cardui	Painted Lady	Jun. 18,	F.J.H.J.
Vanessa Atalanta...	Red Admiral	May 6,	E.M.
V. Io	Peacock	Mar. 4,	F.W.G.
V. Polychloros	Large Tortoise-shell ...	Mar. 7,	E.M.
V. Urticæ	Small Tortoise-shell ...	Mar. 4,	F.P.L.
„ (larvæ)...	„ „ „ ...	May 31,	E.M.
Argynnis Euphrosyne	Pearl-bordered Fritillary	May 23,	F.J.H.J.
Nemeobius Lucina	Duke of Burgundy ...	May 23,	E.M.
Thecla Quercus (larva) ...	Purple Hairstreak ...	Jun. 2,	E.M.
T. Rubi	Green Hairstreak ...	May 23,	E.M.
Chrysophanus Phlæas ...	Small Copper	May 24,	F.W.G.
Polyommatus Argiolus ...	Holly Blue	Apr. 14,	E.M.
P. Alsus...	Bedford Blue	Jun. 27,	E.M.
P. Alexis	Common Blue	May 26,	F.J.H.J.
P. Agestis	Brown Argus	Jun. 14,	F.J.H.J.
Thymele Alveolus	Grizzled Skipper ...	May 23,	F.J.H.J.
Thanaos Tages	Dingy Skipper	May 26,	E.M.
Pamphila Sylvanus	Large Skipper	Jun. 13,	E.M.

SPHINGINA.

† Procris Geryon	Cistus Forester	Jun. 14,	E.M.
Anthrocera Filipendulæ ...	Burnet...	Jun. 23,	J.B.K.
Smerinthus Ocellatus	Eyed Hawk...	Jun. 13,	F.J.H.J.
S. Populi	Poplar Hawk	May 27,	E.M.
S. Tiliæ (bred)	Lime Hawk...	Mar. 31,	F.P.L.
Sphinx Ligustri (bred) ...	Privet Hawk	Jun. 23,	E.M.
Chærocampa Porcellus... ...	Small Elephant Hawk	Jun. 22,	F.J.H.J.
Macroglossa Stellatarum ...	Humming Bird Hawk	Apr. 11,	G.W.L.

BOMBYCINA.

Hepialus Lupulinus	Common Swift	Jun. 10,	E.M.
H. Humuli	Ghost Swift	Jun. 17,	J.B.K.
Cossus Ligniperda (larva) ...	Goat	Jun. 8,	A.H.G.S.
Cerura Vinula	Puss	Jun. 22,	E.M.

† Leiocampa Dictæa	Swallow Prominent ...	May 14, E.M.
Diloba Cæruleocephala (larva)	Figure of eight	Jun. 2, E.M.
† Peridea Trepida...	Great Prominent ...	May 5, E.M.
Pygæra Bucephala (bred) ...	Buff-tip	May 5, E.M.
Dasychira Pudibunda	Pale Tussock	Jun. 1, E.M.
Demas Coryli (bred)	Nut-tree Tussock ...	Mar. 13, F.P.L.
Porthesia Auriflua (larva) ...	Gold-tail	May 9, E.M.
† Lithosia Aureola	Orange Footman ...	May 2, E.M.
L. Complanula (larva)... ...	Common Footman ...	Apr. 25, E.M.
† Œnistis Quadra (larva) ...	Large Footman	Jun. 4, E.M.
Gnophria Rubricollis (bred)	Red-necked Footman...	Jun. 8, F.J.H.J.
Arctia Caja (larva)	Tiger	Apr. 15, E.M.
Nemeophila Plantaginis ...	Wood Tiger...	Jun. 14, F.J.H.J.
Phragmatobia Fuliginosa ...	Ruby Tiger...	Mar. 17, T.A.P.
Spilosoma Menthastri	White Ermine	May 8, E.M.
S. Lubricipeda	Buff Ermine	May 28, E.M.
Diaphora Mendica	Muslin	May 7, G.J.S.
Callimorpha Jacobææ... ...	Cinnabar	Jun. 15, H.S.P.
Lasiocampa Quercus (larva)	Oak Eggar	Apr. 11, E.M.
Eriogaster Lanestris (larva)	Small Eggar	May 31, E.M.
Odonestis Potatoria (larva)...	Drinker	Apr. 27, E.M.
„ „ „ (bred)...	„	Jun. 23, F.J.H.J.
Cilix Spinula...	Chinese Character ...	Jun. 16, W.M.
Drepana Hamula	Oak Hook-tip	May 31, E.M.
D. Unguicula...	Beech Hook-tip	May 5, C.S.P.
	NOCTUINA.	
† Thyatira Derasa...	Buff Arches...	Jun. 21, E.M.
Bryophila Perla	Marbled Beauty... ...	Jun. 21, W.M.
„ „ (larva) ...	... ...	Apr. 11, E.M.
Acronycta Psi	Grey Dagger	Jun. 1, E.M.
A. Aceris (bred)	... ...	Jun. 20, E.M.
A. Megacephala (bred) ...	... ...	Apr. 25, E.M.
† Axylia Putris	... ...	Jun. 22, F.J.H.J.
Xylophasia Rurea...	... ...	Jun. 18, E.M.
Mamestra Brassicæ	... ...	May 4, E.M.
Apamea Basilinea	... ...	Jun. 5, A.H.G.S.
Triphæna Pronuba (larva) ...	Yellow Underwing ...	May 3, E.M.
Trachea Piniperda (bred) ...	Pine Beauty	Mar. 5, E.M.
„ „ „ (taken) ...	... ...	Apr. 11, E.M.
Tæniocampa Gothica (bred)	... ...	Feb. 25, F.P.L.
T. Instabilis (bred)	... ...	Mar. 1, E.M.

T. Stabilis (bred)	Common Quaker ...	Feb. 26, E.M.
„ „ (larva)	... ...	May 30, E.M.
† T. Gracilis	... ...	April 8, F.P.L.
† T. Miniosa (larva)	... ...	June 22, F.J.H.J.
T. Cruda (bred)	.. ..	Feb. 26, E.M.
Scopelosoma Satellitia... ...	... ...	April 27, E.M.
† Hecatera Serena	... ...	June 17, J.H.W.L.
Aplecta Nebulosa (bred) ...	... ...	June 23, E.M.
Hadena Oleracea (bred) ...	... ...	May 17, F.P.L.
„ „ (taken) ...	... ...	June 7, E.M.
† Xylocampa Litherhiza ...	.. ..	Mar. 6, E.M.
Calocampa Exoleta	Sword-grass	April 15, F.J.H.J.
Cucullia Verbasci (larva) ...	Mullein	June 21, F.J.H.J.
† Brephos Parthenias (bred)	... ...	April 1, E.M.
† B. Notha	... ...	Mar. 4, E.M.
† Abrostola Triplasia	... ...	June 1, E.M.
Plusia Iota	... ...	June 17, E.M.
P. Gamma	Silver Y	June 14, F.J.H.J.
Gonoptera Libatrix	Herald...	Feb. 20, W.H.S.L.
Amphipyra Pyramidea (larva)	... ...	June 10, F.J.H.J.
A. Tragopogonis (larva) ...	Mouse	June 10, F.J.H.J.
Euclidia Mi	Mother Shipton ...	June 14, F.J.H.J.
Phytometra Æneas	... ...	June 18, F.J.H.J.
	GEOMETRINA.	
Rumia Cratægata	Brimstone	April 27, J.S.
Ellopia Fasciaria (larva) ...	... ...	April 11, E.M.
„ „ (bred) ...	... ...	June 14, E.M.
Eurymene Dolobraria	Scorch-wing	May 31, E.M.
Selenia Illunaria	Early Thorn	Mar. 16, F.J.H.J.
S. Lunaria	... ...	June 13, F.J.H.J.
Odontopera Bidentata	Scolloped Hazel ...	May 26, E.M.
† Nyssia Hispidaria	Pale Brindled Beauty	Mar. 13, E.M.
Amphidasis Prodromaria ...	Oak Beauty	Mar. 5, F.P.L.
A. Betularia	Peppered	June 22, H.J.C.S.
Hemerophila Abruptaria ...	Waved Umbre ...	April 30, F.J.H.J.
Cleora Lichenaria (larva) ...	... ...	June 4, E.M.
† Boarmia Consortaria ...	Pale Oak Beauty ...	June 13, E.M.
Tephrosia Crepuscularia ...	Small Engrailed ...	April 22, E.M.
† T. Laricaria	Engrailed	April 27, E.M.
† T. Extersaria	Brindled White-spot ...	May 24, E.M.
Iodis Lactearia	Little Emerald ...	May 24, E.M.

Ephyra Porata	... ...	June 17, F.J.H.J.
E. Punctaria	Maiden's Blush ...	May 28, E.M.
E. Trilinearia...	Clay Triple-lines ...	May 31, E.M.
E. Omicronaria	Mocha	May 31, E.M.
E. Pendularia	Birch Mocha	May 28, E.M.
Asthena Luteata	Small Yellow Wave ...	June 13, E.M.
A. Candidata...	Small White Wave ...	May 21, E.M.
A. Sylvata	Waved Carpet ...	May 28, E.M.
Acidalia Remutata	Cream Wave	May 24, E.M.
A. Aversata	Riband Wave... ...	June 22, E.M.
Cabera Pusaria	White Wave	June 1, E.M.
C. Exanthemata	Common Wave ...	May 24, E.M.
Corycia Punctata	Clouded Silver ...	May 11, E.M.
C. Taminata	... ...	May 4, E.M.
Strenia Clathrata...	Latticed Heath ...	May 9, E.M.
Lozogramma Petraria	Brown Silver-line ...	June 13, E.M.
Numeria Pulveraria	Barred Umber ...	May 24, E.M.
Minoa Euphorbiata	... ...	May 26, F.J.H.J.
Abraxas Grossulariata (larva)	Magpie	April 11, E.M.
A. Ulmata	Clouded Magpie ...	June 15, W.F.R.
Ligdia Adustata	Scorched Carpet ...	June 1, E.M.
Lomaspilis Marginata ...	Clouded Border ...	June 15, F.J.H.J.
Hybernia Rupicapraria ...	Early Moth	Feb. 20, E.M.
„ „ „ (larva)	... ...	April 28, E.M.
H. Leucophearia	Spring Usher... ...	Feb. 14, E.M.
H. Progemmaria (bred) ...	Dotted Border ...	Feb. 21, E.M.
H. Defoliaria (larva)	Mottled Umber ...	May 14, E.M.
Anisopteryx Æscularia ...	March Moth	March 16, E.M.
Cheimatobia Brumata (larva)	Winter Moth	May 8, E.M.
Oporabia Dilutata (larva) ...	November Moth ...	May 18, F.J.H.J.
Larentia Didymata	Twin-spot Carpet ...	June 15, F.J.H.J.
L. Multistrigaria	... ...	March 7, E.M.
L. Miaria	Green Carpet... ...	May 24, E.M.
Emmelesia Affinitata	Rivulet	May 30, E.M.
Eupithecia Centaureata ...	... ...	April 28, G.C.M.
E. Castigata	... ...	May 9, E.M.
† E. Valerianata	Valerian Pug	June 12, E.M.
† E. Lariciata	Larch Pug	June 7, E.M.
† E. Irriguata	.. ..	May 7, E.M.
E. Vulgata	Common Pug	May 15, E.M.
† E. Absynthiata...	Wormwood Pug ...	May 28, E.M.

† E. Dodoneata	Oak Pug	April 23, E.M.
† E. Abbreviata	... ...	April 23, E.M.
E. Exiguata	... ...	May 25, E.M.
E. Pumilata	... ...	April 23, E.M.
† Lobophora Lobulata	... ...	April 26, E.M.
† Thera Variata (larva)	... ...	March 28, E.M.
,, ,, (taken)	... ...	May 2, E.M.
† T. Firmaria (larva)	... ...	April 11, E.M.
Melanthia Ocellata	Purple-bar	June 13, E.M.
Melanippe Hastata	Argent and Sable ...	May 18, E.M.
M. Biriviata	Common Carpet ...	April 20, E.M.
M. Montanata	Silver-ground Carpet...	May 23, F.J.H.J.
M. Fluctuata	Garden Carpet ...	April 11, E.M.
Anticlea Rubidata	... ...	June 14, E.M.
A. Badiata	Shoulder Stripe ...	April 6, E.M.
A. Derivata	Streamer	April 20, E.M.
Coremia Ferrugaria	... ...	May 16, F.J.H.J.
C. Unidentaria	... ...	June 5, E.M.
Camptogramma Bilineata ...	Yellow Shell	May 27, E.M.
Phibalapteryx Tersata ...	... ...	June 1, E.M.
Scotosia Dubitata	Tissue	March 16, S.D.S.
S. Certata	Scarce Tissue	May 2, W.H.S.L.
Cidaria Miata	Green Carpet	April 23, E.M.
C. Corylata	Broken-barred Carpet	May 14, E.M.
C. Russata	Common Marbled Carpet	May 27, E.M.
† C. Silaceata	... ...	May 9, T.A.P.
Odezia Chærophyllata	Chimney-sweep ...	June 18, E.M.
	PYRALIDINA.	
Hypena Proboscidalis	Snout	June 13, F.J.H.J.
† H. Rostralis	... ...	Feb. 1, E.M.
Herminia Barbalis	... ...	May 28, E.M.
Pyrausta Ostrinalis	... ...	June 14, E.M.
Herbula Cespitalis	... ...	May 8, E.M.
Botys Fuscalis	... ...	June 11, E.M.
B. Pandalis	... ...	June 18, F.J.H.J.
B. Urticata	Small Magpie... ...	June 18, E.M.
Pionea Forficalis	... ...	June 5, E.M.
Scopula Olivalis	... ...	June 15, F.J.H.J.
† Nola Cristulalis	... ...	May 3, E.M.
Simaethis Fabriciana	Nettle-tap	May 16, E.M.
Eudorea Pyralella	... ...	May 22, E.M.

Aphomia Colonella ... ... June 19, E.M.
Crambus Pratellus ... ... May 24, E.M.
C. Pascuellus ... ... June 18, E.M.
C. Hortuellus ... ... June 15, F.P.L.
† C. Culmellus ... ... June 20, E.M.
Chloephora Prasinana (bred) Green Silver-lines ... Apr. 28, E.M.
" " " (taken) ... ... June 17, F.J.H.J.
C. Quercana (larva) ... ... June 4, E.M.

TORTRICINA.

Eulia Ministrana ... ... May 22, E.M.
Antithesia Cynosbatella ... ... June 17, E.M.
A. Pruniana ... ... June 12, E.M.
Tortrix Viridana ... ... June 22, F.J.H.J.
T. Forsterana ... ... June 19, E.M.
Lozotænia Musculana ... ... May 24, E.M.
L. Unifasciana ... ... June 23, F.J.H.J.
Pardia Tripunctana ... ... May 24, E.M.
Lithographia Campoliliana ... ... June 1, E.M.
Phlæodes Tetraquetrana ... ... May 7, E.M.
Catoptria Scopoliana ... ... June 17, E.M.
Halonota Brunnichiana ... ... May 30, F.J.H.J.
Dicrorampha Plumbagana ... ... June 1, E.M.
Anchylopera Mitterbacheriana ... ... June 11, E.M.
A. Diminutana ... ... June 1, E.M.
A. Lundana ... ... May 11, E.M.
Argyrotoza Conwayana ... ... May 24, E.M.
Hemerosia Rheediella ... ... Apr. 30, E.M.
Oxygrapha Literana ... ... Apr. 20, E.M.
Peronea Hastiana ... ... Apr. 10, E.M.
Roxana Arcuella ... ... June 4, E.M.
Ephippiphora Argyrana ... ... May 7, E.M.
Stigmonota Compositella ... ... June 1, E.M.
S. Perlepidana ... ... May 16, F.J.H.J.
Asthenia Splendidulana ... ... May 14, E.M.
Grapholita Albersana ... ... May 22, E.M.
G. Hypericana ... ... June 16, E.M.
Cnephasia Hybridana ... ... May 23, E.M.
C. Subjectana ... ... June 20, E.M.
Sericoris Lacunana ... ... June 20, E.M.
Lobesia Reliquana ... ... May 22, E.M.
Chrosis Tesserana ... ... June 21, F.J.H.J.

Eupoecilia Maculosana... ... ... May 24, E.M.
E. Ruficiliana ... ... May 20, E.M.
Xanthosetia Hamana ... ... June 20, E.M.
Tortricodes Hyemana ... ... Feb. 21, E.M.

TINEINA.

Chimabacche Fagella ... ... Mar. 28, E.M.
Tinea Rusticella ... ... May 24, E.M.
T. Pellionella ... ... May 15, S.D.S.
T. Lapella ... ... April 30, E.M.
Lampronia Rubiella ... ... June 13, E.M.
Incurvaria Masculella... ... ... May 1, F.P.L.
Nemophora Swammerdamella ... ... May 22, E.M.
N. Schwarziella ... ... May 14, E.M.
Adela Fibulella ... ... June 4, F.J.H.J.
A. Degeerella ... ... May 31, E.M.
A. Viridella ... ... May 4, E.M.
Micropteryx Seppella ... ... May 21, E.M.
M. Thunbergella ... ... May 14, E.M.
M. Subpurpurella... ... ... April 16, E.M.
Swammerdamia Apicella ... ... May 17, E.M.
Anesychia Decemguttella ... ... June 17, E.M.
Plutella Cruciferarum... ... ... April 18, E.M.
Cerostoma Radiatella ... ... Mar. 14, E.M.
Depressaria Arenella ... ... Mar. 14, E.M.
D. Propinquella ... ... Mar. 16, E.M.
D. Subpropinquella ... ... Mar. 14, E.M.
D. Alstroemeriana... ... ... Mar. 16, E.M.
D. Purpurea ... ... Mar. 14, E.M.
D. Applana ... ... Feb. 28, E.M.
D. Ciliella ... ... Mar. 14, E.M.
D. Pimpinellæ ... ... Mar. 30, E.M.
D. Albipunctella ... ... Mar. 14, E.M.
D. Chærophylli ... ... May 20, E.M.
D. Ultimella ... ... Mar. 14, E.M.
D. Nervosa ... ... Mar. 30, E.M.
D. Heracliana ... ... Mar. 14, E.M.
Gelechia Luculella ... ... May 30, F.J.H.J.
Harpella Geoffrella ... ... June 16, E.M.
Dasycera Sulphurella ... ... May 7, E.M.
Œcophora Pseudospretella ... ... May 16, F.J.H.J.
Endrosis Fenestrella ... ... Jan. 1, E.M.

Pancalia Leuwenhœkella ... ... May 23, F.J.H.J.
Glyphipteryx Fuscoviridella ... ... May 15, E.M.
G. Fischeriella ... ... June 1, F.J.H.J.
Antispila Pfeifferella .. .. May 16, E.M.
Tinagma Sericiellum ... ... May 16, E.M.
Argyresthia Mendica ... ... June 14, F.J.H.J.
Gracilaria Swederella ... ... May 2, E.M.
G. Syringella ... ... May 17, E.M.
G. Omissella ... ... May 24, E.M.
G. Auroguttella ... ... May 16, E.M.
Ornix Avellanella... ... ... April 20, E.M.
O. Anglicella... ... ... May 9, E.M.
Coleophora Nigricella (larva) ... ... May 22, E.M.
Laverna Epilobiella ... ... Mar. 16, E.M.
L. Subbistrigella ... . Mar. 30, E.M.
Chrysoclista Flavicaput ... ... May 26, F.P.L.
Chrysocorys Festaliella ... ... April 27, E.M.
Elachista Albifrontella ... ... June 11, E.M.
E. Luticomella ... ... June 16, F.J.H.J.
E. Nigrella ... ... April 13, E.M.
E. Rufocinerea ... ... May 9, E.M.
E. Cygnipennella ... ... May 24, E.M.
Tischeria Complanella... ... ... June 1, E.M.
Lithocolletis Cramerella ... ... April 23, E.M.
L. Spinolella .. .. May 30, E.M.
L. Pomifoliella ... ... April 30, E.M.
L. Spinicolella ... ... April 30, E.M.
L. Faginella (bred) ... ... April 24, E.M.
L. Quercifoliella ... ... April 20, E.M.
L. Nicellii ... ... June 12, E.M.
Phyllocnistis Saligna ... ... Mar. 16, E.M.
Nepticula Floslactella... ... ... May 17, E.M.
N. Aurella ... ... April 26, E.M.

PTEROPHORINA.

Pterophorus Pterodactylus... ... ... Mar. 15, F.J.H.J.
P. Galactodactylus (larva) ... ... May 11, E.M.
„ „ „ (bred) ... ... June 17, F.J.H.J.
Alucita Polydactyla ... ... Mar. 15, F.J.H.J.

ORNITHOLOGY.

The list which follows calls for few comments: the usual eggs have been taken, and few besides. It is, however, much to be regretted that fellows will not acquaint themselves better with the notes of the commoner birds, which afford a far closer test of the period of arrival of migrants than can be obtained by the eye alone. Such birds as the Turtle Dove, Blackcap, etc., have surely notes easily to be distinguished by anyone who tries.

The following is the list of those whose names occur below:—

A.H.A.	... ...	A. H. Arkle.
A.W.A.	... ...	A. W. Arkle.
E.A.	... ...	E. Aylward.
F.W.L.B.	... ...	F. W. L. Birdwood.
G.E.B.	... ...	G. E. Bridge.
H.M.D.	... ...	H. M. Davis.
R.E.D.	... ...	R. E. Dennett.
R.H.D.	... ...	R. H. Dyball.
F.W.F.	... ...	F. W. Fellowes.
S.E.V.F.	... ...	S. E. V. Fillcul.
J.B.F.	... ...	J. B. Fuller.
A.A.G.	... ...	A. A. Gill.
V.H.	... ...	V. Harke.
W.G.H.	... ...	W. G. Hughes.
E.H.	... ...	E. Hunter.
F.J.H.J.	... ...	F. J. H. Jenkinsen.
L.P.K.	... ...	L. P. Kekewich.
J.B.K.	... ...	J. B. Keyworth.
G.L.L.	... ...	G. L. Laird.
A.C.L.	... ...	A. C. Lavers.
G.A.L.	... ...	G. A. Lefroy.
F.P.L.	... ...	F. P. Lefroy.
F.M.L.	... ...	F. M. Lucas.
H.T.L.	... ...	H. T. Lucas.
N.M.	... ...	N. Manders.
G.C.M.	... ...	G. C. Mansel.
E.P.M.	... ...	E. P. Martin.
B.B.M.	... ...	B. B. Middleton.
E.M.	... ...	E. Millais.
A.T.M.	... ...	A. T. Murray.
J.B.O.	... ...	J. B. Oakeley.
C.S.P.	... ...	C. S. Peach.
A.H.G.S.	... ...	A. H. G. Skrine.

C.A.S.	C. A. Sladen, Esq.
C.S.	C. Square.
J.M.T.	J. M. Templer.
F.E.T.	F. E. Thompson, Esq.
S.F.T.	S. F. Townsend.
A.E.T.	A. E. Townsend.
— W.	—Wardrop.
C.M.W.	C. M. Wilkins.
W.H.W.	W. H. Williams.
J.L.W.	J. L. Worship.

RESIDENTS.

Species.	Date of first egg taken.	By whom taken.
Kestrel, (Falco tinnunculus) ...	April 27, (1 egg) ...	S.F.T. & W.H.W.
Sparrowhawk, (Accipiter Nisus)	May 7, (1 egg) ...	S.F.T. & W.H.W.
Tawny Owl, (Syrnium aluco) ...	April 22, (2 eggs)...	H.T.L.
Missel Thrush, (Turdus viscivorus)	March 18, (1 egg)...	E.H.
Song Thrush, (T. musicus) ...	March 9, ...	S.F.T. & W.H.W.
Blackbird, (T. merula) ...	March 20, (2 eggs)	C.A.S.
Hedgesparrow, (Accentor modularis)	April 9, (4 eggs) ...	A.H.G.S. & C.S.
Robin, (Erythaca rubecula) ...	March 9, (5 eggs, hardset).	
Great Tit, (Parus major) ...	May 28, (1 egg) ...	S.F.T. & W.H.W.
Blue Tit, (P. cæruleus) ...	May 4, (eggs hard set)	H.M.D. & C.S.P.
Cole Tit, (P. ater)	May 11, ...	S.F.T. & W.H.W.
Longtailed Tit, (P. caudatus) ...	May 7, (1 egg) ...	S.F.T. & W.H.W.
Pied Wagtail, (Motacilla Yarrallii)	May 11, (2 eggs) ...	A.H.G.S.
Meadow Pipit, (Anthus pratensis)	May 14, (6 eggs) ...	F.M.L.
Skylark, (Alauda arvensis) ...	May 6, (2 eggs, set)	E.H.
Bunting, (Emberiza miliaria)....	May 24, (5 eggs) ..	S.F.T. & W.H.W.
Blackheaded Bunting, (E. schæniclus)	May 7, (1 egg) ...	G.C.M.
Yellow Ammer, (E. citrinella)	May 4, (3 eggs) ..	S.F.T. & W.H.W.
Chaffinch, (Fringilla cœlebs) ...	April 22, (1 egg) ...	E.H.
House-sparrow, (Passer domesticus)	April 28, (3 eggs)..	S.F.T. & W.H.W.
Greenfinch, (Coccothraustes chloris)	May 2, (?) ...	C.S.P.
Goldfinch, (Carduelis elegans)...	April 29, (5 eggs)...	S.F.T. & W.H.W.
Linnet, (Linota cannabina) ...	April 17, (1 egg) ...	S.F.T., W.H.W.
Bullfinch, (Pyrrhula vulgaris). ..	May 9, (5 eggs) ...	A.E.T.
Starling, (Sturnus vulgaris) ...	April 18, (1 egg) ...	S.F.T. & W.H.W.
Carrion Crow, (Corvus corone)...	May 24, (nest) ...	A.E.T.
Rook, (C. frugilegus)	March 12, (3 eggs)	S.F.T., W.H.W., and G.L.L.

Jackdaw, (C. monedula) ...	April 17, (2 eggs)...	J.M.T.
Magpie, (Pica caudata)... ...	April 9, (6 eggs) ...	H.M.D. and V.H.
Jay, (Garrula glandarius) ...	May 9, (5 eggs) ...	S.F.T. & W.H.W.
Creeper, (Certhia familiaris) ...	April 22, (?) ...	A.H.G.S.
Wren, (Troglodytes vulgaris) ...	April 29, (2 eggs)	J.B.F.
Nuthatch, (Sitta Europæa) ...	May 1, (1 egg) ...	S.F.T. & W.H.W.
Kingfisher, (Alcedo ispida) ...	May 24, (young) ...	A.H.G.S. & A.E.T.
Ringdove, (Columba palumbus)	March 11, (2 eggs)	A.E.T.
Stockdove, (C. œnas)	May 9	A.E.T.
Pheasant, (Phasianus Colchicus)	April 30, (4 eggs)...	reported by S.F.T. and W.H.W.
Partridge, (Perdix cinerea) ...	May 24, (11 eggs)	A.E.T.
Peewit, (Vanellus cristatus) ...	March 27, (4 eggs)	S.F.T. & W.H.W.
Moorhen, (Gallinula chloropus...	May 1, (6 eggs)	
Coot, (Fulica atra)	April 30, ...	J.B.O.
Wild Duck, (Anas boschas) ...	May 11, (eggs set)	J.B.O.
Dabchick, (Podiceps minor) ...	May 11, (1 egg) ...	(earlier J.B.O.)

SUMMER VISITORS.

	Heard or seen.	Date of first egg taken.	By whom taken.
Red-backed shrike (Lanius collurio) ...		May 27 (3 eggs)	F.J.H.J.
Spotted flycatcher, (Muscicapa grisola)	Ap. 30	May 30 (5 eggs)	A.E.T.
Redstart, (Phœnicura ruticilla)	May 1.	May 11 (4 eggs)	S.F.T. & W.H.W.
Stonechat, (Saxicola rubicola)	? resident	June 1 (6 eggs)	S.F.T. & W.H.W.
Whinchat (S. rubetra)		May 20 (6 eggs)	S.F.T. & W.H.W.
Wheatear (S. œnanthe)		May 10.	
Grasshopper Warbler (Salicaria locustella)	May 9.		
Sedge Warbler (S. phragmitis) ...		May 9 (3 eggs)	A.E.T.
Reed Warbler (S. arundinacea) ...		May 31 (young)	A.H.G.S.
Nightingale (Philomela luscinia) ...		June 13 (4 eggs)	F.J.H.T.
Blackcap (Curruca atricapilla) ...		May 10 (5 eggs)	S.F.T. & W.H.W.
Garden Warbler (C. hortensis) ...		May 3 (1 egg)	G.H.L.
Whitethroat (C. cinerea) ...	Ap. 26.	May 9 (3 eggs)	J.B.O.
Lesser Whitethroat (C. garrula) ...		May 17 ...	J.B.K.
Wood Wren (Sylvia sibilatrix)	Ap. 27.		
Willow Wren (S. trochilus) ...	Mar. 31.	May 9 (6 eggs)	J.B.O.
Chiffchaff (S. hippolais) ...	Mar. 31.		
Tree Pipit (Anthus arboreus)		May 26 (4 eggs)	F.J.H.J.
Cuckoo (Cuculus canorus) ...	Ap. 2.	June 4	S.F.T. & W.H.W.

Swallow (Hirundo rustica)	...Ap. 2.	June 11 (2 eggs)	A.E.T. & H.T.L.
Martin (H. urbica) ...	...Ap. 10.		
Swift (Cypselus apus)	...May 4.		
Turtle Dove (Columba turtur) ...	...	June 15 (2 eggs)	A.H.G.S.
Landrail (Crex pratensis)	...Ap. 28.		
WINTER VISITORS.			
Fieldfare (Turdus pilaris)	... seen Mar. 2.		J.B.O.

BOTANY.

Names of those whose Initials occur in the following List, or who have contributed towards the completion of the calendar.

S.F.B.	S. F. Biddulph
J.C.B.	J. C. Brown
C.M.B.	C. M. Bull, Esq.
E.D.P.C.	E. D. P. Cambridge
H.H.C.	H. H. Champion .
M.A.C.	M. A. Chilton
L.D.	L. Davies
G.W.D.L.... ...	Rev. G. W. DeLisle
R.E.D.	R. E. Dennett
S.B.D.	S. B. Dixon, Esq., F.G.S.
R.W.D.	R. W. Doyne
J.W.D.	J. W. Dudding
F.W.F.	Rev. F. W. Farrar, F.R.S.
W.F.	W. Fergus, Esq., M.D.
H.H.F.	H. H. Fitzpatrick
F.	— Flux
H.F.	H. Francis
J.F.B.	J. B. Fuller
E.R.G.	E. R. Gardiner
J.H.G.	J. H. Garland
H.B.H.	H. B. Homer, Esq.
C.W.H.	C. W. Houghton
W.H.	W. Hughes
E.H.	E. Hunter
E.F. im T. ...	E. F. im Thurn, Esq.
F.J.H.J.	F. J. H. Jenkinson

L.P.K.	L. P. Kekewich
A.C.L.	A. C. Lavers
L.	— Longman
F.M.L.	F. M. Lucas
W.H.M.	W. H. Macdonald, Esq.
W.M.H.M. ...	W. M. H. Milner
E.F.N.	E. F. Newman
J.B.O.	J. B. Oakeley
C.S.P.	C. S. Peach
H.H.P.	H. H. Phear
A.E.P.	Mr. A. E. Perkins
P.	— Pyrke
G.F.R.	G. F. Rodwell, Esq., F.C.S.
W.F.R.	W. F. Rogers
R.S.	R. Simpson
A.H.G.S.	A. H. G. Skrine
H.J.C.S.	H. J. C. Smelt
T.N.H.S.	T. N. H. Smith
S.J.S	S. J. Soady
J.S.	Rev. J. Sowerby
J.E.S.	J. E. Square
F.S.	F. Storr, Esq.
J.C.S	J. C. Swan
C.W.T.	Rev. C. W. Tayler
F.E.T.	F. E. Thompson, Esq.
C.E.T.	Rev. C. E. Thorpe
R.L.T.	R. L. Tisdall
S.F.T.	S. F. Townsend
A.E.T.	A. E. Townsend
D.W.	D. Womersley

Thalictrum—	
flavum	* Jun. 14, by Jun. 24.
Anemone—	
memorosa ...	Feb. 29, L.D. and H.H.C.
*hepatica ...	full, Feb. 9, G.W.D.L.
Myosurus—	
minimus ...	Ap. 29.

Ranunculus—	
trichophyllus	Ap. 23.
Drouetii ...	Ap. 26.
pseudo-fluitans	March 17, Lockeridge; Mar. 19, Ogbourn.
heterophyllus	May 8, (full).
peltatus ...	Ap. 5.
circinatus ...	by June 15, (no flowers, May 24).

hederaceus ... full May 24.
sceleratus ... full June 15.
flammula ... May 8.
ficaria ... ... Feb. 10, G.W.D.L.
auricomus ... Mar. 6, A.E.T.; Mar. 20, E.H.
acris ... ... Ap. 5, (in one field only)—26.
repens ... ... Ap. 3.
bulbosus ... Ap. 3, G.W.D.L.
arvensis ... May 5.
parviflorus ... May 11.

Caltha—
palustris ... Feb. 14; Mar. 3.

Trollius—
*Europeus ... Ap. 3, G.W.D.L.

Eranthis—
*hyemalis ... full Feb. 9.

Helleborus—
viridis ... ... Mar. 3.

Aquilegia—
*vulgaris ... Ap. 30.

Berberis—
vulgaris ... bud Ap. 11; May 9.

Papaver—
Argemone ... by June 18.
rhœas ... ... May 28.
dubium ... May 31.
Lecoqii ... June 4.
*orientale ... May 30.

Chelidonium—
majus ... ... Ap. 12.

Corydalis—
*solida... ... Mar. 5, G.W.D.L.
*lutea ... ... Mar. 24.

Fumaria—
officinalis ... Ap. 30.

Cheiranthus ...
*cheiri... ... Feb. 29, G.W.D.L.

Nasturtium—
officinale ... June 18.

Diplotaxis—
*muralis ... Ap. 4.

Barbarea—
vulgaris ... Ap. 12, 26.

Arabis—
hirsuta ... May 3, C.E.T.

Cardamine—
sylvatica ... Ap. 11, (out a few days.)
hirsuta... ... Feb. 17.
pratensis ... Mar. 12.

Sisymbrium—
officinale ... May 9, F.J.H.J.
thalianum .. Mar. 31.

Alliaria—
officinalis ... Mar. 31, Oare; Ap. 6, Marlborough.

Brassica—
oleracea ... by Ap. 30.
campestris ... by Ap. 30.
Rapa ... ... Mar. 31, A.H.G.S.

Sinapis—
arvensis ... Mar. 12; Mar. 31, A.H.G.S.
alba ... ... *May 8, seed May 20.

Aubrietia—
*purpurea ... Feb. 14.

Draba—
verna ... ... Mar. 3, A.H.G.S.
*aizoides ... March 5.

Armoracia—
rusticana ... May 14.

Lepidium—
campestre ... Mar. 1; Ap. 9.

Thlaspi—
arvense ... *Mar. 5; by Jun. 4.

Capsella—
bursa-pastoris Jan. 27; by Ap. 12.

Senebiera—
coronopus ... *Ap. 18; May 30.

Raphanus—
Raphanistrum May 9.
Reseda—
lutea ... ... June 15.
luteola... ... just out, May 24.
Helianthemum
vulgare ... May 5, J.B.F.; May 16.
Viola—
odorata ... Feb. 21.
hirta ... ... Mar. 3, W.G.H.
Reichenbachiana May 29, A.E.T.
Riviniana ... Mar. 12.
canina ... ... full May 17.
tricolor ... by May 24.
(var) arvensis Feb. 7.
Polygala—
vulgaris ... Ap. 18, W.M.H.M.
Dianthus—
*plumarius... June 10.
*barbatus ... June 21, P. and L.
Silene—
inflata ... ... June 11.
Lychnis—
flos-cuculi ... *Ap 16; May 9, E.F.H.
vespertina ... Ap. 30.
diurna ... ... Mar. 1, Ap. 26; G.W.D.L.
Githago ... *Jun. 10, Jun. 13.
Sagina—
procumbens May 9, A.H.G.S.
Arenaria—
trinervis ... Ap. 5.
serpyllifolia... Mar. 3.
leptoclados ... May 24, (full).
Stellaria—
media ... ... Feb. 2.
Holostea ... Mar. 30, G.W.D.L. Ap. 5.
graminea ... Feb. 29, A.H.G.S. May 24.
uliginosa ... May 5.
Cerastium—
glomeratum full Feb. 7.
trivale ... ... full Feb. 7.
*grandiflorum May 25.
Malva—
moschata ... only in bud Jun 24.
sylvestris ... June 15, M.A.C.
rotundifolia... May 24.
Tilia—
parvifolia ... only in young bud June 24.
Hypericum—
perforatum ... coloured bud June 23.
humifusum ... June 22, F.J.H.J.
hirsutum ... coloured bud, June 15.
Acer—
campestre ... May 12, A.H.G.S.
Pseudo-platanus May 3.
Æsculus—
Hippocastanum Ap. 30, W.F., May 9.
Geranium—
* phæum ... May 5.
* sylvaticum May 8.
pratense ... June 9, A.C.L. & W.H.
*sanguineum June 5.
* lancastriense June 3.
pyrenaicum * Ap. 16, by June 15.
dissectum ... May 9.
columbinum May 30.
rotundifolium May 22.
molle ... ... Mar. 20, G.W.D.L.
lucidum .. May 3, C.E.T.
Robertianum Mar. 23, C.W.T., May 2.
Erodium—

cicutarium ... March 31, May 3.
Linum—
catharticum May 5.
Oxalis—
acetosella ... March 3, C.S.P.
Euonymus—
Europæus ... May 24.
Staphylea—
* pinnata ... Ap. 25, H.B.H.
Rhamnus—
catharticus ... by June 13.
Ulex—
Europæus ... Feb. 2.
Genista—
tinctoria ... * June 24.
Sarothamnus—
scoparius ... Ap. 12, A.H.G.S.
Medicago—
lupulina ... Ap. 13.
Melilotus—
officinalis ... June 15.
Trifolium—
pratense ... bud Ap. 15, May 3.
* incarnatum May 24.
repens ... ... Ap. 30.
procumbens... June 4.
minus ... ... Ap. 30.
Lotus—
corniculatus May 20.
Anthyllis—
vulneraria ... May 1, G.W.D.L.
Astragalus
glycyphyllos bud June 15.
Vicia—
hirsuta... ... May 2, May 20.
sylvatica ... by June 15, T.N.H.S.
sepium... ... Ap. 15.
sativa ... ... May 20.
Lathyrus—
pratensis ... June 4.
macrorhizus Ap. 13, E.H.
Orobus—
* vernus ... March 8.
Hippocrepis—
comosa... ... May 3.
Onobrychis—
sativa ... ... May 20.
Cytisus
* Laburnum... May 14, A.H.G.S.
Prunus—
spinosa ... March 19, (Pewsey), S.B.D.; March 30, S.F.T. & J.E.S.
insititia ... Ap. 5.
domestica ... Ap. 18 (full) C.S.P. & A.H.G.S.
Avium ... ... (Mar. 18), Ap. 2, C.S.P.
* Padus .. about Ap. 29.
* Lauro-cerasus Ap. 12.
Spiræa—
ulmaria ... June 21, P. & L.
Filipendula ... * June 14.
Poterium—
Sanguisorba Ap. 29.
Agrimonia—
eupatoria ... June 21, P. & L.
Alchemilla
vulgaris ... * Mar. 20, Ap. 29, G.W.D.L.
arvensis ... Ap. 11.
Sibbaldia—
* procumbens May 2.
Potentilla—
anserina ... May 9, E.F.N.
reptans ... June 20, G.W.D.L.
Tormentilla... May 1, F.J.H.J.
fragariastrum * Feb. 14, Feb. 24, H.H.P.
Fragaria—
vesca ... ... Mar. 8, Ap. 6.
Rubus—

Idæus ... ... bud Ap. 18.
corylifolius ? June 15.
Balfourianus ? June 21.
cæsius ... ... May 25.

Geum—
urbanum ... Ap. 29.
intermedium * March 29.
rivale ... ... * March 3, Mar. 31.

Rosa—
tomentosa ... June 15, (at Binck-Knoll)
canina ... ... June 9, A.H.G.S.
arvensis ... June 15.

Crataegus—
oxyacantha ... May 9, A.H.G.S.

Pyrus—
malus ... ... Ap. 27, C.S.P. & S.F.B.
* aucuparia ... full May 28.
* Japonica ... Feb. 27.
* Apricot ... Mar. 8, G.W.D.L.
* Pear (ag. wall) Mar. 28, G.W.D.L.
* Plum ... ... Ap. 4, A.H.G.S.

Epilobium—
montanum ... * June 17, June 22.

Bryonia—
dioica ... ... June 23, W.H.

Spergula—
arvensis ... bud March 31, Ap. 30, full bud May 9.

Scleranthus—
annuus ... ... * May 2, May 9.

Sedum—
* Rhodiola ... Ap. 14.
album ... ... coloured buds, June 24.
* hispanicum ... June 17.
acre ... .. June 15, (Avebury), June 21.

Ribes—
grossularia ... March 12.
rubrum ... March 26, (possibly earlier).
nigrum ... ... * bud March 31, A.H.G.S.
* sanguineum Feb. 27.
* aureum ... Ap. 3.

Saxifraga—
* umbrosa ... May 2.
* hirsuta ... Ap. 30.
* oppositifolia Feb. 26.
* crassifolia ... March 5.
* palmata ... Ap. 13.
* rupestris ... Ap. 24.
* aizoon ... Ap. 25.
* cæspitosa ... May 2.
* incrustata May 2.
* Andrewsii ... May 11.
* tenella ... May 11.
* nodosa ... May 25.
tridactylites March 17.
granulata ... Ap. 18, A.H.G.S.

Chrysosplenium—
oppositifolium May 9.

Philadelphus—
* Coronarius about June 10.

Sanicula—
Europæa ... May 3.

Ægopodium—
podagraria ... bud May 9, just out May 24.

Bunium—
flexuosum ... May 9, F.J.H.J.

Pimpinella—
saxifraga ... April 12, May 5, May 14, June 16.

Bupleurum—
* falcatum ... June 17.

Œnanthe—
crocata ... ... May 28.

Æthusa—
cynapium ... June 2.

Meum—
*Athamanticum full bud Ap. 30.
Pastinaca—
sativa ... ... March 3, 24, Ap 27, (hybern.) May 30.
Heracleum—
sphondylium March 12, A.E.T. & D.W.; Ap. 23.
Daucus—
carota ... ... May 5, May 24, bud June 13.
Torilis—
Anthriscus ... June 12, F.
Scandix—
pecten ... ... March 1, Ap. 30.
Anthriscus—
sylvestris ... March 3, 16.
Chærophyllum—
temulum ... * March 5, Ap. 11.
Adoxa—
moschatellina Feb. 21.
Cornus—
sanguinea ... June 18, W.H. & R.S.
* mascula ... Feb. 13.
Sambucus—
nigra ... ... June 1.
Viburnum—
lantana ... Ap. 16, F.W.F.
opulus ... ... barren May 30, fertile June 11, W.H.
Lonicera—
* caprifolium Ap. 30., A.H.G.S.
Periclymenum June 17, A.E.T.
Symphoricarpos
* racemosus by Ju. 11, A.H.G.S.
Sherardia—
arvensis ... Feb. 7, Ap. 25, G.W.D.L.
Asperula—
cynanchica ... June 1.
odorata ... * Ap. 18, Ap. 30.
Galium—
cruciatum ... Ap. 10, G.W.D.L. May 3.
Aparine ... May 5.
Mollugo ... June 16, W.H. & A.C.L.
saxatile ... June 10, F.J.H.J.
palustre ... bud June 21, P. & L.
var. Witheringii June 21, P. & L.
Valeriana—
officinalis ... June 14, W.H.
dioica ... ... * Ap. 16, Ap. 20, G.W.D.L.
Valerianella—
olitoria... ... Feb. 21, Ap. 12, (one flower).
Knautia—
arvensis ... June 13.
Petasites—
vulgaris ... Feb. 26.
Tussilago—
Farfara... ... Feb. 13.
Erigeron—
acris ... ... by June 21, P. & L.
Bellis—
perennis ... Jan. 31.
Inula—
* Helenium ... nearly out June 24.
Achillea—
* tomentosa May 25.
Millefolium ... May 24.
Anthemis—
cotula ... ... bud June 13, fl. June 23.
Matricaria—
inodora... ... Feb. 29, Ap. 15, May 5, full bud June 22.
Chrysanthemum
Leucanthemum May 9, J.W.D.
Filago—

germanica ... bud June 11.
Doronicum—
* Pardalianches Ap. 10.
Senecio—
vulgaris ... Feb. 2.
Jacobæa ... May 24, C.W.H.; June 2, F.J.H.J.
aquaticus ... coloured buds June 23.
campestris ... May 14, F.J.H.J.
Centaurea—
nigra ... ... June 21, P. and L.
cyanus ... ... * June 17.
scabiosa ... June 23.
Carduus—
nutans ... ... Ap. 9, Ap. 30.
crispus ... ... May 12, 20.
arvensis ... June 11.
palustris ... May 24.
Silybum—
* marianum ... May 31.
Lapsana—
communis ... June 22.
Hypochœris—
radicata ... Ap. 30, May 9, 16.
Apargia—
hispida ... ... May 20.
Tragopogon—
minor ... ... May 20.
Leontodon—
taraxacum ... Feb. 2.
Sonchus—
oleraceus ... May 12, G.W.D.L.
asper ... ... Ap. 15, May 13.
Mulgedium—
* alpinum ... June 24.
Crepis—
virens ... ... Ap. 30, May 12.
*aurea ... ... May 3.
Hieracium—
pilosella ... May 5.
* aurantianum June 23.
Campanula—
glomerata ... * May 28.
* latifolia ... June 22.
Trachelium ... June 22.
Specularia—
hybrida ... by June 15.
Arctostaphilos—
* uva-ursi ... Ap. 9.
Ilex—
aquifolium ... May 24.
Ligustrum—
vulgare ... June 21, P. and L.
Fraxinus
excelsior ... March 31.
Syringa—
* vulgaris ... white Ap. 27, G.W.D.L. purple May 2.
Vinca—
minor ... ... Feb. 14, G.W.D.L.
major ... ... * March 19.
Gentiana—
amarella ... May 26, J.C.B.
Menyanthes ...
trifoliata ... May 2.
Polemonium—
cæruleum ... May 9, F.J.H.J. & J.B.O.
Convolvulus—
arvensis ... June 15, M.A.C.
Cynoglossum—
officinale ... May 20, June 3, F.J.H.J.
Borago—
* officinalis ... March 4.
Lycopsis
arvensis ... * May 1, by May 9.
Symphytum—
officinale ... Ap. 24.
asperrimum ... by June 16, W.H.

Echium—
vulgare ... * June 22.
Pulmonaria—
officinalis ... March 7, (much earlier at Mildenhall)
Lithospermum—
officinale ... May 20.
arvense ... Ap.12,28 G.W.D.L.
Myosotis—
palustris ... May 17, (in green)
arvensis ... Ap. 6, E. F. im. T.
collina ... ... Ap. 7.
versicolor ... Ap. 30.
Solanum—
Dulcamara ... June 15.
Atropa—
* Belladonna May 25.
Hyoscyamus—
niger ... ... May 30.
Lycium—
*barbarum ... fullMay2,(Pewsey) byMay 12 (Marlborough, S.J.S.
Orobanche—
minor ... ... full June 20, F.J.H.J.
Lathræa—
squamaria ... Mar. 10, E.R.G. & G.C.S.
Verbascum—
Thapsus ... Jun. 21, F.J.H.J.
nigrum... ... young bud June 23.
Digitalis—
*purpurea ... just out June 10.
Linaria—
cymbalaria ... Mar. 25, in fl. Ap. 26.
minor ... ... *June 8.
vulgaris ... Jun 21, F.J.H.J.
Scrophularia—
nodosa ... ... May 24.
aquatica ... Jun. 21, P. & L.
*vernalis ... Mar. 10, G.W.D.L.
Melampyrum—
pratense ... June 1.
Pedicularis—
sylvatica ... Ap. 18, A.H.G.S.
palustris ... May 24.
Rhinanthus—
Crista-galli ... May 8.
Euphrasia—
officinalis ... May 24.
odontites ... June 15.
Veronica—
Anagallis ... June 15.
Beccabunga... May 5.
Chamædrys... Mar. 12.
officinalis ... May 9.
serpyllifolia... Mar. 3, 17.
arvensis ... Mar. 3.
agrestis ... Mar. 4.
polita ... ... Feb. 7.
Buxbaumii ... Feb. 7.
hederifolia ... Feb. 7.
Salvia—
*verbenaca ... May 2.
Thymus—
serpyllum ... June 4.
Calamintha—
acinos ... ... *May 25.
Prunella—
vulgaris ... June 21, P. & L.
Nepeta—
Glechoma ... March 4.
Lamium—
*Mussini ... Ap. 4.
amplexicaule March 1, 16.
purpureum ... Feb. 2.
album ... ... Jan. 29.
*maculatum March 4.

Galeobdolon Ap. 30.
incisum ... March 31 (full.)
Stachys—
sylvatica ... June 4.
Ajuga—
reptans ... Ap. 15.
Primula—
vulgaris ... Feb. 9, 25; H.J.S. W., & R.L.T.
caulescens ... Ap. 4.
veris ... ... Mar. 8, 19, H.H.F.
Lysimachia—
Nummularia June 24.
Anagallis—
arvensis ... by June 15.
Dodecatheon—
*meadea ... Ap. 17.
Plantago—
lanceolata ... March 31, Ap. 15.
media ... ... May 24.
major ... ... *by June 14; June 15.
Chenopodium—
Bonus-Henricus Ap. 26.
Rumex—
conglomeratus June 24.
sanguineus ... June 25.
obtusifolius June 13.
crispus... ... June 16.
Hydrolapathum June 24, (only one plant).
acetosa ... May 9.
acetosella ... Mar. 31, Ap. 26.
Polygonum—
Bistorta ... May 9.
amphibium ... June 15.
Daphne—
*mezereum ... February.
Laureola ... *Feb. 9; full Feb. 14, G.W.D.L.
Buxus—
sempervirens Feb. 9.
Euphorbia—
Helioscopia... Feb. 7, Mar. 12, Ap. 29; G.W.D.L.
amygdaloides Ap. 13, G.W.D.L.
Peplus... ... May 9.
*Lathyris ... May 30.
Mercurialis—
perennis ... Feb. 9.
Callitriche—
verna ... ... May 24.
Urtica—
urens ... ... by Ap. 11.
dioica ... ... May 24.
Ulmus—
suberosa ... March 4.
montana ... March 4.
Salix—
caprea ... ... about Feb. 25.
viminalis ... Feb. 24, A.H.G.S.
purpurea ... Mar. 12, A.E.T.
triandra ... Ap. 5.
Populus—
nigra ... ... Mar. 3.
Quercus—
Robur ... ... May 8.
Corylus— barren.
avellana ... barren, Jan. 29; fertile, Feb. 2.
Carpinus—
Betulus ... Ap. 17, G.W.D.L.
Taxus—
baccata ... Feb. 13.
Juniperus—
communis ... Ap. 9.
Pinus—
sylvestris .. June 1.
Larix—
Europæa ... Mar. 15, A.H.G.S.
Paris—
quadrifolia ... *Ap. 14, full May 24.

Tamus—
communis ... June 15.
Orchis—
morio ... ... Ap. 15.
mascula ... Ap. 9, (white one, Ap. 20, G.W.D.L.)
ustulata ... May 5.
maculata ... June 4.
incarnata ... May 14; *May 3.
Gymnadenia—
conopsea ... June 1.
Habenaria—
viridis ... ... May 24.
chlorantha ... full bud, Ap. 29, J.B.F.; fl. May 24.
Ophrys—
muscifera ... full June 15; T.N.H.S.
Listera—
ovata ... ... May 16.
Neottia—
nidus-avis ... by May 30, A.H.G.S.
Iris—
Pseudacorus June 9.
fœtidissimus * June 28.
Crocus—
* vernus ... full Feb. 9.
Narcissus—
pseudo-narcissus* Feb. 25, Feb. 26.
Galanthus—
nivalis ... ... June 21, C.M.B. June 27, A.E.P.
Convallaria—
* majalis ... May 2, A.H.G.S.
Polygonatum—
multiflorum bud Ap 6, E.F. im T. fl. May 20.
Ruscus—
aculeatus ... Feb 8.
Fritillaria—
* Imperialis March 18, W.H.M. (not general.)
Allium—
*Schœnoprasum May 25.
ursinum ... bud March 23, fl. May 8.
* moly ... ... June 17.
Endymion —
nutans ... ... March 31, Miss Manders.
Juncus—
effusus ... ... young bud, June 15.
conglomeratus young bud, June 15.
glaucus ... young bud, June 24.
bufonius ... young bud, June 15.
Luzula—
pilosa ... ... March 2.
campestris ... March 12.
Alisma—
multiflora ... by May 24.
plantago ... June 15.
Sagittaria—
sagittifolia ... June 15.
Arum—
maculatum ... Ap. 12.
Lemna—
trisulca ... June 15, (no flower.)
Potamogeton—
natans ... ... June 15.
crispus ... ... June 16.
Eleocharis—
palustris ... by May 30.
Carex—
disticha ... * May 25, May 30.
divulsa ... * Ap. 24, May 3.
paniculata ... Ap. 30.
* pendula ... * May 2.
præcox ... ... Ap. 13.
glauca ... ... Ap. 15.
sylvatica ... May 9.
paludosa ... Ap. 16, G.W.D.L.

riparia ... ... Ap.15,(not fully out.)
Phalaris—
arundinacea June 15.
Anthoxanthum—
odoratum ... Ap. 8, G.W.D.L.
Ap. 11.
Phleum—
pratense ... June 13.
Alopecurus—
pratensis ... Ap. 4.
geniculatus... May 26.
agrestis .. May 17, A.H.G.S.
Milium—
effusum ... May 20.
Holcus—
lanatus... ... May 10.
Aira—
cæspitosa ... June 24.
Trisetum—
flavescens ... June 4.
Avena—
pratensis ... May 5.
pubescens ... May 11.
Arrhenatherum—
avenaceum ... May 24.
Koeleria—
cristata ... May 30.
Melica—
uniflora ... by May 16.
Poa—
annua ... ... Feb. 9.
nemoralis ... May 30.
trivialis ... May 20.
pratensis ... Ap. 13.
Catabrosa—
aquatica ... by June 15.
Glyceria—
fluitans ... May 8.
plicata ... ... May 9.
Briza—
media ... ... May 24, 30.
Cynosurus—
cristatus ... May 31.
Dactylis—
glomerata ... Ap. 28.
Festuca—
sciuroides ... June 21, P. & L.
ovina ... ... May 5.
rubra ... ... May 9.
pratensis ... June 13.
Bromus—
erectus... ... Ap. 30.
asper ... ... May 20.
sterilis... ... April 30.
Serrafalcus—
racemosus ... June 11.
mollis ... ... April 12.
Brachypodium—
sylvaticum ... June 15.
Lolium—
perenne ... April 30.
Equisetum—
arvense ... April 9, G.W.D.L.
limosum ... May 30.
Botrychium—
Lunaria ... April 11, F.J.H.J.
Rye ... ... April 29, G.W.L.D.
Wheat ... ... June 16.

REMARKS, &c.

Ranunculus Drouetii, &c.—a very interesting series of these water Ranunculi was found by the Rev. J. Sowerby in the ponds extending from Overton to Glory Ann. In the pond nearest Overton, the floating leaves presented every gradation from the flat to the capillary forms.

Ranunculus parviflorus—the date of flowering is that of the only specimen found and which had been transferred to the Botanical Garden. The only field in which it is known to occur had been ploughed up, and all the plants destroyed.

Lepidium campestre—roadside by the "Ailesbury Arms," on the Bath Road, J.S.

Thlaspi arvense—the plants in the Botanical Garden began to flower as early as March 5th. Wild specimens were coming into flower by June 4th.

Rhamnus catharticus—very few flowers observed and all of them petal-less.

Melilotus officinalis—plentiful at Binck-Knoll.

Vicia tetrasperma—no flowers observed.

Cytisus Laburnum—many trees were absolutely flowerless and no tree had more than a few scattered flowers. In some cases no buds at all seem to have been formed, and in all other cases they had been destroyed by the frosts in May.

Prunus spinosa—this and the other varieties, *(Prunus communis)* were remarkably late this year, notwithstanding the mild January and February.

Rubus corylifolius—I believe the specimens are correctly so named; of *Balfourianus* there is more doubt. The specimens brought in were so small that there were necessarily great doubts about their names.

Chrysosplenium oppositifolium—found in water meadows between Pewsey and New Mill.

Syringa vulgaris—almost every flower bud was destroyed by the frost. In some few instances a few buds survived, but they were very few.

Gentiana Amarella—a few remarkably early specimens were observed near the West Woods and on Ogbourne Downs.

Polemonium cæruleum—a fresh locality discovered by J.B.F. between Pewsey and New Mill.

Myosotis palustris—very late and very scarce.

Larix europæa—a single specimen observed in flower in the school field—no other specimen observed in flower anywhere.

Ophrys muscifera—an addition to our List. Found by T.N.H.S. at Binck-Knoll.

Listera ovata—just in flower May 16th, remained in that state for a fortnight afterwards.

Neottia nidus-avis—only one specimen observed.

Luzula multiflora—an addition to our List, apparently not very uncommon. The "first discoverer" has not revealed his name.

Lemna trisulca—an addition to our List. Found in a pond about a mile and a half from the Crofton Reservoir by J.S.

Catabrosa aquatica—found at Binck-knoll.

Festuca sciuroides—found at Savernake.

The mild January and February enabled far more than the usual number of plants to come into flower. May was an exceedingly cold month and the number in flower was far fewer than usual—on the 24th (the whole holiday) 254 out of 260, the greatest possible number, was brought in by different collectors.

During January, the number of flowers out during the month was 11.

February	52
March	109
April	146
May	254
June	271

DONATIONS TO THE MUSEUM.

Geology.—

A series of specimens of Rocks from Aden by Rev. G. W. de Lisle.

Stalactite from Busage, Gloucestershire, by M. A. Chilton.

Fine Specimen of Stalactitic Iron from the Forest of Dean, by the Clifton College Scientific Society.

Various fossils from D. E. Olivier and C. A. Sladen, Esq.

Specimen of Bismuth, by W. Fergus, Esq., M.D.

Shark's Teeth from Las Palmas, Grand Canary, at a height of 500 feet above the sea, by C. W. Houghton.

Archæology.—

Coins by Mr. A. E. Perkins, G. E. C. Crawford, Esq., and G. E. Bridge.

Specimens of Ancient Pottery, by A. H. G. Skrine.

Old Key from Newport, Isle of Wight, by G. E. Mew.

Horn and Wood from the ruins of Moscow, by W. Fergus, Esq., M.D.

Lava from Pompeii, by M. A. Chilton.

Specimen of old painted Glass, by M. A. Chilton.

Zoology.—

Skull of Crocodile, by M. E. D. Prothero.

A fine Collection of Shells, by Rev. F. W. Farrar, F.R.S.

Skin of Alligator's Head
Skulls of Bear and Man } by E. Hunter.

Palate of Shark, by W. Fergus, Esq., M.D.

Specimen of Australian Pigeon, by N. Whiting.

A box of Skins of Indian Birds, by A. G. C. Carnegy.

Various.—

Petroleum Shell, "Siege Bread," and Lock of Gun fired by the Communists } by E. Millais.

Roots of Aloe and "New Zealand Flax," by F. W. L. Birdwood.

Plants and Seeds of rare British Plants, by Dr. J. W. D. Hooker, F.R.S.

Plant of *Astrantia major*, from Shropshire, by N. D. Latouche.

Tracings of the original drawings taken during the Franklin Expedition } by M. A. Chilton.

Stick of Cabbage-wood, by E. Hunter.

Library.—

Sowerby's "British Shells."—Purchased.
"British Beetles," by Wood, by W. M. H. Milner.
Clifton College Scientific Society Proceedings, by that Society.
Rugby School Natural History Society Report, by that Society.
"Science Gossip" and "Popular Science Review," by Rev. J. M. Fuller.
"The Field," by the Common Room.
"Geologist" and "Zoologist."—Purchased.

A large collection of Indian Moths and Butterflies, from Capt. R. B. Reed, and a collection of Indian curiosities from H. C. Spry, Esq., are also on their way to England, but have not yet been received.

DONATIONS TO THE FUNDS OF THE SOCIETY.

A. H. G. Skrine ...	...	...	0 5 0
R. Hunter, Esq. ...	...	...	1 1 0
D. E. Leighton, Esq.	...	...	0 10 0
			£1 16 0

REPORTS.

No. printed...	400
Given to Honorary Members ...	49
Donors	40
Sold	301
In hand	10
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ACCOUNTS.

	£	s.	d.		£	s.	d.
Balance in hand	4	9	0	Subscription to Wilts Archæological Society...	0	10	6
Subscriptions—Hon. Mem.	4	12	0	Plates for the Report, Christmas, 1871	5	15	3
,, Members	3	13	6	Midsummer, 1872... ...	1	18	0
,, Associates	0	1	6	Binding	0	18	8
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	£79	12	6		£79	12	6

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FLORA

OF

MARLBOROUGH,

BY THE

REV. T. A. PRESTON.

Second Edition.—Part III.

MIDSUMMER, 1872.

FLORA OF MARLBOROUGH.

PART II.

2. CALYCIFLORÆ.

Petals distinct (not united as in Convolvulus) and stamens not inserted into the receptacle below the ovary, but to a fleshy ring or disk attached to the calyx, surrounding or covering the ovary. In the former case the stamens are said to be *perigynous*, in the latter *epigynous*. The distinct petals separate plants of this division from those of No. 3, (Corollifloræ), and the stamens not being inserted *below* the ovary (*hypogynous*) separate them from those of No. 1. In some cases it is difficult to know exactly whether the stamens are perigynous or hypogynous, but those cases are very few except in *Leguminosæ*.

Exceptions and remarks.

The stamens are attached to the petals in *Crassulaceæ*, and very obscurely attached to the calyx in *Leguminosæ*.

The petals are wanting in *Rhamnus* (occasionally), *Alchemilla*, *Poterium*, *Peplis*, (occasionally) *Chrysosplenium*, and in some of the flowers of *Myriophyllum*.

The petals are united in *Bryonia* and *Montia*, and are coherent in *Trifolium* and *Anthyllis* (in which genus the wings and keel are united.)

The flowers are *monœcious*—(*i.e.*, having stamens only in one flower, and pistils only in another on the same plant) in *Poterium* and *Myriophyllum*.

Stamens perigynous.

Corolla irregular ... ... 21. Leguminosæ.
Corolla regular
Stamens indefinite ... ... 22. Rosaceæ.
Stamens definite
Style 1
Leaves alternate ... ... 20. Rhamnaceæ.
Leaves opposite

A small glabrous annual ... 23. Lythraceæ (Peplis.)
A shrub ... ... 19. Celastraceæ.
Style more than 1
Leaves succulent ... ... 28. Crassulaceæ.
Leaves not succulent ... ... 30. Saxifragaceæ.
Corolla 0
Stamens indefinite ... ... 22. Rosaceæ (Poterium.)
Stamens 4 (or 5)
A low prostrate annual ... ... 22. Rosaceæ (Alchemilla.)
A Shrub ... ... 20. Rhamnaceæ.
Stamens 6 ... ... 23. Lythraceæ (Peplis.)
Stamens 8 (or 10)
Styles 4 ... ... 25. Haloragaceæ.
Styles 2 ... ... 30. Saxifragaceæ (Chrysosplenium.)
Stamens epigynous
Petals united
Large climbing plants ... ... 26. Cucurbitaceæ.
Small annual ... ... 27. Portulaceæ.
Petals distinct
Parts in 4's
Fruit succulent ... ... 33. Cornaceæ.
Fruit dry ... ... 24. Onagraceæ.
Parts in 5's
Flowers in umbels
Fruit a berry ... ... 32. Hederaceæ.
Fruit dry ... ... 31. Umbelliferæ.
Flowers solitary, or in racemes ... ... 29. Ribesiaceæ.

19. CELASTRACEÆ.

1. Euonymus Linn.

1. E. europæus Linn. *Prickwood. Spindle Tree.*

Bab. 77. Hook. 82. Benth. 104.

Copses and hedges. Sh. May, June.

A shrub with insignificant greenish-white flowers, and opposite leaves. Twigs often dark green, bluntly quadrangular, capsule generally four-lobed, pale crimson when ripe, each of the cells containing a seed covered with a bright, reddish-orange covering (*arillus*) with an uneven surface.

Commonly distributed.

1865. May 16.
1866. May 29.
1867. May 19.
1868. May 16.
1869. May 13.
1870. May 27.
1871. May 17.

20. RHAMNACEÆ.

1. Rhamnus Linn.

1. **R. catharticus** Linn. *Buckthorn.*

Bab. 77. Hook 82. Benth. 105.

Hedges and thickets. Sh. May, June.

A much-branched, rigid shrub, with small greenish-yellow flowers in clusters (*cymes*) in the axils of the leaves. Stamens opposite the petals. Petals small, sometimes wanting.

Generally distributed, but by no means common.

1865. May 28.
1866. June 6.
1867. June 3.
1868. May 25.
1869. June 13.
1870. May 28.
1871. June 11.

21. LEGUMINOSÆ.

Readily known by the flowers and fruit, the former being what is called *butterfly-shaped* (papilionaceous), composed of five petals; two slightly united, forming a covering over the stamens, and called the *keel;* two others, one on each side of the keel, called *wings*; and a fifth of a very different size and shape, and often of a different colour, called the *standard.* The latter consists of a *pod* (legume), generally splitting into two portions, the seeds being arranged in a row along one side only. In *Trifolium* the petals are often connected together and attached to the stamens by their lower parts or *claws.*

Widely as these plants differ from those of the next order (Rosaceæ), there are such intermediate forms between the two, that, when the plants of the whole world are considered, there is a very remarkable series of connecting links between the two. It may be observed, however, that in those plants which have the flower not papilionaceous, the fruit is always a legume.

The following table of genera refers, of course, only to Marlborough species:—

Leaflets 0 *or* 1 *(except in seedlings)*

Shrubs—calyx deeply two-lipped, yellow... ... 1. Ulex.
calyx shortly two-lipped, green ... ... 2. Genista.
Annuals ... ... 12. Lathyrus.

Leaflets 3

Shrubs, all the stamens united
flowers yellow... ... ... 3. Sarothamnus.
flowers pink ... ... 4. Ononis.
Herbs, one stamen free
flowers in long racemes ... ... 6. Melilotus.
flowers in very short racemes, almost like heads ... ... 5. Medicago.
flowers in heads ... ... 7. Trifolium.

Leaflets 3, *with a pair at the base of the leafstalk* ... 8. Lotus.

Leaflets 4 *or more, with an odd leaflet at the end*

Pods longer than the calyx
pods short, wrinkled, flowers rosy red ... 14. Onobrychis.
pods jointed, flowers yellow ... ... 13. Hippocrepis.
pods one inch long, flowers creamy white... 10. Astragalus.
Pods enclosed in the (inflated) calyx, flower yellow 9. Anthyllis.

Leaflets six or more, with a tendril or point at the end of the leaf

Style thin, hairy all round, leaflets small, flowers pale or dark *purple* ... 11. Vicia.
Style flat, hairy on upper side only, leaflets large, flowers yellow or crimson when fresh ... 12. Lathyrus.

1. Ulex Linn.

A much branched, thorny shrub; the leaves three-foliate in young plants, but reduced to small spines or scales in older ones. Calyx very nearly of the same colour as the corolla,—pods small, scarcely longer than the calyx. The two species occurring here may be thus distinguished—

Calyx, with numerous spreading hairs, bracts large... ... 1. europæus.
Calyx finely downy, bracts very minute ... ... 2. Gallii.

1. U. europæus Linn. *Furze. Whin. Gorse.*

Bab. 80 Hook. 86. Benth. 107.

Heaths. Sh. Jan. to May.

From four to six feet high, all the short small branches ending in thorns. Flowers in the axils of the leaves forming showy racemes, very sweet-scented.

Occurs in all the divisions, plentifully in parts, especially on Clench Common, in Savernake Forest, Row down, and about Avebury.

1865. April 3. 1869. All the year.
1866. In fl. Feb. 25. 1870. All the year.
1867. Feb. 11. 1871. By Feb. 16.
1868. Full Mar. 3.

U. Gallii Planch.

Bab. 80. Hook. 86. Benth. 108 (U. nanus)

Heaths. Sh. August to October.

Smaller than *U. europæus*, though large specimens are often taken for it. The flowers are also of a more golden hue, the bracts very minute, and the calyx downy, not hairy.

I.—Shaw Farm, Clatford. Martinsell.

II.—Savernake Forest. Bedwyn.

1866. In fl. Sept. 24. 1870. In fl. Sept. 25.
1869. Full fl. Sept. 1. 1871. In fl. in Sept.

2. Genista Linn.

Shrubs. Calyx with five teeth, the two upper much longer than the three lower. Petals yellow. The two species as yet detected about Marlborough are easily distinguished by their stems:

No spines, pods flattened... ... ... 1. tinctoria.
Branches spinous, pods inflated ... ... 2. anglica.

1. G. tinctoria Linn. *Dyer's Greenweed.*

Bab. 81. Hook. 85. Benth. 108.

Pastures and Thickets. Sh. July to September.

Stem decumbent at the base with erect branches. Stipules minute, flowers in short racemes.

I.—In Clatford Vale.

II.—Bedwyn Common. Bedwyn Brails.

IV.—Long's Penning, Overton. Avebury Down. Chisledon.

1866. Bud June 13. 1870. June 12.
1868. Full June 1. 1871. By June 25.

2. G. anglica. *Needle-whin. Petty-whin.*

Bab. 81. Hook. 86. Benth. 106.

Heaths. Sh. May June.

Stem spinous, stipules 0, flowers solitary, in the axils of the leaves, but arranged so as to form leafy racemes.

Scarce, only occurs in

II.—Near the obelisk in Savernake Forest, *J.J.P.*; Bedwyn, *J.P.*

1865. May 22 (out some days). 1867. Just out May 18.

3. Sarothamnus Wimm.

1. S. scoparius Koch. *Broom.*

Bab. 81. Hook. 87 (Cytisus). Benth. 110 (Cytisus).

Dry hills and heaths. Sh. April to June.

A shrub from two to six feet high, with numerous long wiry branches. Flowers bright yellow, solitary or in pairs. Style very long and spirally curved.

Scarce in the immediate neighbourhood of Marlborough.

I.—Clench; West Woods; Burbage; hedge between Wan's Dyke and Manton Copse; Pewsey.

II.—Savernake.

1865. May 17.
1866. Full May 5.
1867. May 23.
1868. April 22.
1869. March 23.
1870. April 19.
1871. Full May 2.

4. Ononis Linn.

1. O. arvensis Linn. *Wild Liquorice. Rest-harrow.*

Bab. 81. Hook. 86. Benth. 110.

Dry barren places. Sh. June, July.

A low, much-branched shrub; stems procumbent, rooting at the base, uniformly hairy, viscid, rarely spinous. Pods falling short of the calyx.

I.—Wan's Dyke, near Granham; Martinsell; Oare Hill, *J.S.*; Pewsey, *T.F.R.*

II.—Forest Hill, *R.R.P.H.*

III.—Mildenhall; Ogbourne, *J.J.P.*; Axford.

IV.—Side of Bath road, about one mile from Marlborough; Avebury.

1866. End June 13. 1870. June 16.
1868. June 20.

O. campestris Koch, known by its erect spinous stems, with a line of hairs down each side, and its pods exceeding the calyx, has been reported to have occurred about Marlborough, but the few specimens preserved are only spinous forms of *O. arvensis*.

5. Medicago Linn.

Two species only of this genus have as yet been detected about Marlborough, one evidently an escape from cultivation and only occurring occasionally. They are known by their flowers and general habit.

1. M. sativa Linn. *Lucerne.*

Bab. 82. Hook. 88. Benth. 112.

Hedgebanks and borders of fields. P. June, July.

Stems erect, two to three feet high, glabrous; flowers large, in racemes, blue (rarely yellow); pods twisted so as to form two or three coils.

I.—Pewsey Downs, *T.F.R.*

II.—Hedge near Barton Farm, *S. F. Townsend.*

2. M. lupulina Linn. *Black Medick.*

Bab. 82. Hook. 89. Benth. 112.

Waste ground and fields. A. or B. April to July.

Stems procumbent, spreading widely, six inches to two feet long, generally downy, though glabrous in luxuriant specimens. Flowers small in dense oval spikes, yellow. Pods kidney-shaped, with a spiral point and raised veins, glabrous or only slightly hairy, black when ripe.

Common.

1865. By April 23.
1866. May 1.
1867. May 6.
1868. April 18,
1869. April 19.
1870. April 18.
1871. April 20.

5. Melilotus Linn.

Till quite recently, but a single locality for one species (*M officinalis*) was known. Last year one fresh species has been added to our list. The plants are very similar, from 2 to 3 feet high, fragrant, and with the flowers in long racemes. They may be thus distinguished.

pods hairy	1. officinalis.
pods glabrous	2. arvensis.

1. M. officinalis Willd. *Melilot.*

Bab. 83. Hook. 90. Benth. 113.

Waste places. B ? June to August.

Flowers yellow, wings, keel and standard all equal, pods acute, wrinkled, hairy, black when ripe.

Very scarce near Marlborough, only one locality known at present, and not always to be found there.

III.—Rabley Copse; Binck Knoll (plentiful).

2. M. arvensis Willd.

Bab. 83. Hook. 90. Benth. 113.

Waste places. B. June to August.

Flowers yellow or white; wings and standard equal and longer than the keel. Pods rounded at the top, glabrous, brownish olive (not black) when ripe. Closely resembling the former though not so large in any of its parts.

I.—Field near Martinsell, J.S.; white var. at Windmill Hill, Overton, J.S.

IV.—Field near Barton Farm, F.E.T.

Probably introduced.

7. Trifolium Linn.

Low herbs. Flowers in heads or dense spikes. Petals often connected together and attached to the tube of stamens by their claws, and usually remaining round the pod after flowering; the cohesion of the petals serves as a marked distinction for plants of this genus from those of all other allied genera.

Flowers reddish purple, large ... ... 1. pratense.
Flowers pinkish or white
Fowers in a cylindrical head ... ... 2. arvense.
Flowers in a very globular head, bent down after flowering.
Stems creeping ... ... 3. repens.
Stems erect... ... ... 4. hybridum.
Flowers yellow
Heads of from 30 to 40 flowers ... ... 5. procumbens.
Heads of from 10 to 20 flowers ... ... 6. minus.

Besides the above *T. incarnatum* with its pointed head of brilliant scarlet flowers will probably be soon naturalized, as it is extensively cultivated, but no specimen has as yet been found which can be at all considered as even an escape.

1. T. **pratense** Linn. *Purple Clover.*

Bab. 84. Hook. 92. Benth. 117.

Meadows and pastures. P. April to September.

Heads of flowers, sessile, or nearly so, in the axils of the uppermost leaves, but so as to appear stalked with two sessile, 3-foliate leaves just beneath the flower heads. Stems perennial but only of a few years' duration. Flowers sometimes, but rarely, white.

Very common.

1865. April 28.
1866. April 30.
1867. May 8.
1868. May 1.
1869. April 24.
1870. May 12.
1871. April 29.

2. T. **arvense** Linn. *Hare's-foot Trefoil.*

Bab. 85. Hook. 91. Benth. 116.

Dry pastures and fields. A. July.

Stem about a foot high, slender and branching. Leaflets narrow. Heads of flowers globular at first, but afterwards cylindrical. Flowers very small, buried in the hairy calyx, whose long teeth project so much as to give a feathery look to the flower.

Very local.

I.—New Payne's Bridge, Pewsey; *T.F.R.* New Mill, *J.S.*

III.—Mildenhall, F.S.

3. T. **repens** Linn. *Dutch or White Clover.*

Bab. 87. Hook. 94. Benth. 120.

Meadows and pastures. P. May to September.

Stems creeping. Flowers in heads on long stalks; the florets are really shortly stalked, all the stalks springing from the same point, and thus the term *head* is hardly correct: after flowering these little stalks (pedicels) lengthen and the flowers are bent down. "In damp seasons these pods often take the form of a horn or small leaf."

Abundant.

1865. May 13.
1866. May 23.
1867. May 15.
1868. May 19.
1869. May 5.
1870. May 18.
1871. May 1, 12.

4. T. **hybridum** Linn. *Alsike Clover.*

Bab. 87. Hook. 93. Benth. 120.

Fields. P. July to September.

Very closely allied to *T. repens*, but never rooting at the joints; stems erect, petals more pinkish, stipules larger.

An escape from cultivation and becoming naturalized in many spots.

I.—New Mill; Wilcot.

II.—Savernake.

III.—Poulton.

5. **procumbens** Linn. *Hop-Trefoil.*

Bab. 88. Hook. 94. Benth. 120.

Dry pastures, banks, &c. A. May to August.

A slender annual much branched at the base, downy; heads of from 30 to 50 small yellow flowers, which ultimately turn brown and become deflexed as in *T. repens*. Pods one seeded completely concealed by the withered petals.

Generally distributed, but not very abundant, especially fine on the Railway Banks.

1865. By June 15.
1869. By May 27.
1870. June 7.
1871. May 26.

6. T. **minus** Sm. *Lesser Hop Trefoil.*

Bab. 88. Hook. 95. Benth. 121.

Dry places. A. May to August.

Very similar to the last, but smaller in all its parts. Plants less downy, generally glabrous, heads of from 10 to 20 flowers. Petals paler. Standard folded over the pod.

Common.

1865. By May 25.	1869. May 6.
1866. By May 23.	1870. May 14.
1867. May 15.	1871. May 12.
1868. May 6.	

8. Lotus Linn.

Herbs with five pinnate leaves, of which two are situated close to the stem so as to assume the position and appearance of stipules. Heads of flowers on long stalks, with a leaf of three leaflets close under it. (The flowers are really shortly stalked so that *umbel* would be a more correct term).

Glabrous or very slightly hairy, teeth of calyx straight in the bud ... ... 1. corniculatus

Hairy, teeth of calyx spreading like a star in the bud 2. major.

1. L. corniculatus Linn. *Bird's-foot Trefoil.*

Bab. 88. Hook 96. Benth. 122.

Pastures, &c. P. May to September.

"Stems very numerous spreading in a circle so as to form roundish tufts." Flowers bright yellow, often tinged with red; leaves rather fleshy.

Common.

1865. May 10.	1869. May 1.
1866. May 28.	1870. May 12.
1867. Full bud May 16.	1871. May 6.
1868. May 13.	

2. L. major Scop. *Greater Bird's-foot Trefoil.*

Bab. 89. Hook 96. Benth. 112.

Damp places. P. June to October.

"Stems given off at intervals, and not all from near the same point, so that the plant does not form dense tufts." Stems erect from one to three feet high, and more or less covered with spreading hairs. The leaves are not so fleshy as in *L. corniculatus*, the heads of flowers are also larger. The star-like appearance of the calyx when in bud, is a very marked feature.

Uncommon ; only occurring in the few very marshy spots about Marlborough.

I.—New Mill ; Newton

II.—Bedwyn Brails.

III.—Axford.

IV.—Chisledon.

1869. Bud June 16 1870. June 23.

9. Anthyllis Linn.

1. A. vulneraria Linn *Kidney Vetch. Lady's Fingers.*

Bab. 89. Hook 95. Benth. 123.

Dry chalky ground P. May to August.

Branches thin and wiry, springing from a woody root stock, leaves pinnate with an odd terminal leaflets which in the lower leaves is much larger than the lateral ones. Heads of flowers in pairs at the ends of the stems, one sessile, the other slightly stalked. Wings and keel cohering, petals pale yellow, the deep red variety not having been found as yet about Marlborough.

Generally distributed on the Downs.

1865. By June 3. 1869. May 11.

1866. May 21. 1870. May 20.

1867. May 15. 1871. May 17.

1868. May 2, 14

10. Astragalus Linn.

1. A. glycyphyllos Linn. *Wild Liquorice. Sweet Milk-vetch.*

Bab. 90. Hook 97. Benth. 124.

Thickets on a chalky or gravelly soil. P. June.

Stems zigzag, glabrous, spreading along the ground to the length of two or three feet. Leaflets eleven or thirteen. Flowers in racemes, shorter than the leaves, creamy white. Pods one inch long divided into two by a spurious partition, each cell with from six to eight seeds.

Very scarce, has only been found at Binck-Knoll by *F.S.*

11. Vicia Linn.

Stems weak, often climbing. Leaflets numerous, the common leaf-stalk ending in a point or tendril, not an odd leaf, by which character the plants of this genus may be separated from all the other Leguminosæ, except *Lathyrus*, and from this they are known by the style, which is hairy all round.

We have seven species of this genus about Marlborough.

Flower stalks at least half as long as the leaves.

Flowers few and small, pods short, scarcely half an inch long.

Pods glabrous

Peduncles with 1 or 2 flowers, pods 4 seeded ... . 2. tetrasperma.

Peduncles with 1 to 4 flowers, pods with 5—8 seeds ... ... 3. gracilis.

Pods hairy ... ... 1. hirsuta.

Flowers half an inch long, pods one inch long.

Flowers white with purple veins ... ... 4. sylvatica.

Flowers rich purple blue ... ... 5. Cracca.

Flower stalks very short.

Flowers three or four together .. .. 6. sepium.

Flowers solitary or rarely two together ... ... 7. sativa.

1. V. hirsuta Koch. *Hairy Tare.*

Bab. 91. Hook 100. Benth. 128.

Hedges and waste places. A. May, June.

Leaflets blunt, the midrib ending in a small point. Flowers pale blue, generally four or six on the same peduncle. Pods hairy, two seeded.

Not uncommon, especially in I and III.

1865. fl. and seed, June 3. 1869. May 12.
1867. May 23. 1870. May 18.
1868. May 13. 1871. May 12.

2. V. tetrasperma Mœnch. *Smooth Tare.*

Bab. 91. Hook 100. Benth. 128.

Hedges and waste places. A. May to July.

Very similar to the last, though rather more delicate. The pods are glabrous and generally contain four seeds.

Much more uncommon than the last.

I.—White Horse Down, *R.R.P.H*; Woodborough, *F.E.T.*
II.—Grove Farm, Stitchcombe, *J.S.*
III.—Mildenhall, *J.W.W*; Rabley.

1865. fl. and sced June 7.
1866. May 29.
1867. June 12.
1868. May 11.
1869. May 7.
1870. by June 3.
1871. by May 26.

3. V. **ilis Lois.**

Bab. 91. Hook 100. Benth. 128.
Hedges and waste places. A. May to Sep.

Considered by Hooker and Bentham as a variety of *V. tetrasperma*, which it resembles in many points. The leaflets are, however, *pointed*, and more numerous (three to four pair). Flowers one to four on each stalk, which ultimately becomes longer than the leaf, pods five to eight seeded.

At present found only on the Railway banks at Marlborough by *J.B.F.* and *E.L.H.*, and at Pewsey by *J.S.*

1869. Sep. 26.
1870. May 27.

4. V. **sylvatica** Linn. *Wood Vetch.*

Bab. 91. Hook. 101. Benth. 129.
Woods and thickets. P. June, July.

Stems from six to eight feet long, glabrous, climbing over the bushes by means of their branched tendrils. Leaflets two to three inches long, with from eight to ten pairs of leaflets. Stipules deeply toothed at the base. Flowers in racemes, six to eighteen on one stalk, which is generally longer than the leaf. Petals white with purple veins.

Not common.

I.—West Woods; Wood by Martinsell.
III.—Rabley Copse; Mildenhall Borders; Binck Knoll, *F. S.*

1865. June 7.
1866. By June 23.
1867. June 10.
1868. June 3.
1869. Bud June 10.
1870. Full June 14.

5. V. **Cracca** Linn. *Tufted Vetch.*

Bab. 92. Hook. 100. Benth. 128.
Hedges, especially in damp situations. P. June to Sep.

Stem from two to four feet long, hairy, climbing by means of its branched tendrils. Leaves one to four inches long, with about ten pairs of leaflets. Stipules entire. Flowers more numerous than in *V. sylvatica*, the stalk not usually exceeding the leaf. Petals rich purple blue.

Generally distributed, but not very common.

1865. June 12.
1866. June 19.
1867. After June 25.
1868. June 8, 19.
1869. Bud June 16.
1870. June 11.
1871. June 8.

6. **V. sepium** Sm. *Bush Vetch.*

Bab. 92. Hook. 101. Benth. 129.

Woods and hedges. P. Ap. to Sep.

Stem from one to two feet high, weak, with a few scattered hairs. Leaves with from four to eight pairs of leaflets, gradually diminishing in size, and terminating in a branched tendril. Flowers in clusters, four to six in each cluster, dull reddish purple of different shades.

Very common.

1865. Ap. 19.
1866. Ap. 27.
1867. Bud Ap. 20, fl. May 5.
1868. Bud Ap. 9, fl. Ap. 14.
1869. Ap. 18.
1870. Ap. 21.
1871. Ap. 25.

7. **V. Sativa** Linn. *Common Vetch.*

Bab. 93. Hook. 102. Benth. 130.

Open woods and dry places. A. Ap. to July.

A very variable plant, of which three forms occur about Marlborough. Stems from one to two feet high, nearly erect or climbing.

Stipules with generally a black spot in the centre. Leaflets from four to seven pairs, variable in breadth. Flowers solitary or two together, reddish or bluish purple.

α. Sativa proper. Stem stout, leaflets broad, flowers in pairs, pods mostly parallel to the stem. A relic of cultivation.

β. angustifolia Roth. Stem slender, leaflets narrow, flowers solitary or in pairs, red or dark purple, pods spreading.

γ. segetalis Thuill. Stem stoutish, leaflets of upper leaves narrow, flowers generally in pairs, pods from one and a half to two inches long, bursting the calyx.

(α) generally distributed (β) scarce—in Rabley Copse, and Mildenhall borders (γ) not uncommon.

1865. (β) fl. and seed June 7.
1866. (β) May 26.
1867. (α) June 1 (β) by June 7.
1868. (α) May 26 (β) May 13.
1869. (α) May 7.
1870. (α) Ap. 23.
1871. (α) May 12.

12. Lathyrus Linn.

A very interesting genus from the variety of modifications of the leaves. As a rule the leaves are larger than in Vicia, but in one species (*L. Aphaca*) there are no true leaves, the whole leaf being transformed into a tendril, whilst the stipules are much developed, so as to give a leafy appearance to the plant. Another species (*L. Nissolia*), not found nearer Marlborough than Syrencot, (and therefore beyond our range) has the stipules very small as well as no leaflets, but the leaf stalks are flattened out so as to assume the appearance of leaves, and thus give a grassy look to the plant.

The general structure of the plant is similar to that of *Vicia*, the distinction being principally in the style.

Flowers yellow.

No true leaves. Leafstalk a mere tendril ...	1. Aphaca
Stalks with a pair of leaflets and a tendril ...	2. pratensis.
Flowers purple, no tendrils	3. macrorrhizus.

1. L. Aphaca Linn. *Yellow Vetchling.*

Bab. 94. Hook. 103. Benth. 132.

Gravelly fields and hedges. A. June, July.

A weak, glabrous annual, without any true leaves. The large stipules (which are heart-shaped, or broadly arrow-shaped) appear like leaves in pairs with a tendril between them. Flowers yellow, generally solitary, on long stalks.

Very scarce, only at present known to occur near Bedwyn, where it was found by *J. S.*, June 17th, 1870.

2. L. pratensis Linn. *Everlasting Tare. Meadow Vetchling.*

Bab. 94. Hook 103. Benth. 132.

Moist meadows. P. May to Sept.

Stems angular, about two feet high. Leaves of two leaflets and a tendril, stipules large, pointed. Flowers stalks long, with from 6—10 flowers on each. Flowers bright yellow.

Not uncommon.

1865. May 31.
1866. Jnne 11.
1867. June 10.
1868. May 16.
1869. June 10.
1870. May 21.
1871. full bud, May 26.

3. L. **macrorrhizus** Wimm. *Tuberous Pea.*

Bab. 95. Hook. 105. Benth. 133.

Woods and thickets. P. April to July.

Rootstock creeping extensively and forming small tubers. The annual stems winged, about a foot high. Leaves with from two to four pairs of leaflets, which are either broadly oval, or almost linear (var. *tenuifolius* Roth), with every intermediate variety. Flowers stalks long, with two to four flowers on each; flowers crimson fading to green or blue.

Not common.

I.—Manton Copse. West Woods, *J.W.M.*

II.—Savernake Forest.

III.—Folly Farm; Mildenhall Borders; Rabley Copse.

1865. Ap. 24.
1866. Ap. 24.
1867. Ap. 22.
1868. Ap. 13.
1869. Ap. 8, 29.
1870. Ap. 16.
1871. Ap. 15, 27.

13. Hippocrepis Linn.

1. H. **comosa** Linn. *Horse-shoe Vetch.*

Bab. 96. Hook. 99. Benth 126.

Chalky banks. P. May to July.

Stems procumbent, often a foot long. Leaves of from 7 to 13 leaflets. Flowers in umbels very similar to those of *Lotus*, but without the three leaflets; they are also more numerous (six to ten flowers in each umbel), smaller and of a more golden yellow. The pods are curiously notched so as to assume the appearance of a string of horse-shoes, placed side by side, but about Marlborough the plant does not appear to ripen its seeds as in fifteen

years I have never once seen the pods here, though common enough elsewhere.

Not uncommon on the Downs. Abundant on Martinsell.

1865.	May 18.	1869.	May 17.
1866.	May 29.	1870.	May 28.
1867.	May 29.	1871.	May 19.
1868.	May 13.		

14. Onobrychis Gaert.

1. **O. sativa** Lam. *Sainfoin. Cock's-head.*

Bab. 96. Hook. 99. Benth. 127.

Chalky banks. P. May to August.

Stem from one to two feet high, hairy. Leaves from three to six inches long, having about twelve pairs of leaflets with an odd terminal one. Flowers in dense racemes on long stalks, rosy red with darker veins. Pods one seeded, often spiny, with netted elevations.

An escape from cultivation, very generally distributed.

1865.	May 19.	1869.	May 17.
1866.	May 28.	1870.	May 12.
1867.	May 31.	1871.	May 17.
1868.	May 13.		

22. Rosaceæ.

A very extensive order embracing plants very dissimilar from one another far more so than one would expect in a natural system. As far as British species (and therefore of Marlborough ones) are concerned, the numerous stamens attached to the calyx will be found a sufficiently comprehensive character, those few which have a definite number of stamens are also petal-less, and their stipules, divided leaves, and the structure of the ovary will prevent any confusion with any other petal-less genera.

The greatest variety of structure occurs in the fruit and as the different tribes are founded in a great measure on that structure, it will be well to enumerate the principal varieties.

1. a *drupe*—a fruit with an outer fleshy covering and an inner "stony" one, as a plum or cherry, containing one or two seeds.
2. a *drupel*—small drupes, the inner covering being hard but not stony—a blackberry consists of a number of drupels.

3. an *achene*—when each seed is enclosed in a thin, hard, dry, tight-fitting covering, the seed with its covering is called an *achene*. The "seeds" of the strawberry are really achenes.
4. a *follicle*—an inflated carpel, opening on the inner side only, where alone the seeds are placed.
5. a *pome*—when the calyx tube becomes fleshy and united to the carpels, so as to form a single fruit, as an apple. The carpels themselves may be either horny, so that the fruit can be cut across with a knife, (as in the apple) or hard and bony (as in the fruit of the hawthorn or medlar).

In Rosa the calyx-tube ultimately becomes fleshy round the achenes, but not adherent to them, and thus forms apparently, but not really a single fruit, these are the "hips" of the hedges.

The plants of this order are divided into three Sub-orders and Tribes.

1. Amygdaleæ—fruit a drupe.
2. Roseæ—carpels distinct from each other and from the calyx.
   - *a.* Spiræidæ—fruit of several follicles.
   - *b.* Sanguisorbidæ fruit of 1—3 carpels enclosed in the dry calyx tube.
   - *c.* Dryadeæ fruit of 5 or more achenes on a dry or succulent receptacle.
   - *d.* Rosidæ, achenes enclosed in the fleshy calyx tube.
3. Pomeæ—fruit a Pome.

These characters are therefore founded on the fruit, but as it is impossible to get both flower and fruit as soon as the plant is in flower, the following table, an exceedingly artificial one, has been drawn up founded on characters which can be seen at the time of flowering or very shortly after it.

Calyx single

Herbs.

Petals 0 ... ... 3. Poterium.

Petals 5

Calyx with hooked bristles ... ... 4. Agrimonia.

Calyx without hooked bristles ... ... 2. Spiræa.

Shrubs or trees

Calyx not surrounding the Carpels ... ... 8. Rubus.

Calyx surrounding the carpels

Calyx not united to the carpels

Calyx falling off.—Stems without prickles ... ... 1. Prunus.

Calyx becoming fleshy. Stems with prickles ... ... 10. Rosa.

Calyx united to the carpels
Carpels membranous. Stems without thorns ... ... 12. Pyrus.
Carpels stony.—Stems thorny ... 11. Crataegus.
Calyx double (five large sepals with five smaller ones between).
Petals 0 ... ... 5. Alchemilla.
Petals 5
Receptacle fleshy ... ... 7. Fragaria.
Receptacle dry
Style elongating ... ... 9. Geum.
Style not elongating ... ... 6. Potentilla.

1. Prunus Linn.

Shrubs or trees, branches sometimes ending in thorns, but never armed with prickles. Sepals united into a cup below, in which is situated the ovary; as soon as the flower has faded the calyx separates from the stalk and falls off, a character peculiar to this genus.

We have three species of this genus.

Leaves rolled together lengthwise in bud ... ... 1. communis.
Leaves folded together in the bud.
A tree, calyx tube contracted at the mouth... ... 2. Avium.
A shrub, calyx tube not contracted at the mouth 3. Cerasus.

1. P. communis Huds. (a) *Sloe. Black-thorn.* (b) *Bullace.*

Bab. 99. Hook 106. Benth. 136.
Hedges and Thickets. Sh. Feb. to May.

A very variable plant, of which there are three very distinct varieties, but they pass into one another so much that it is very difficult, almost impossible, to discriminate in all cases.

a. P. spinosa—Linn. Bark usually black, branches spinous; leaves usually glabrous, appearing after the flowers; flowers usually solitary.

b. P. insititia—Linn. Bark brown, only the lower branches spinous; leaves usually downy underneath, appearing with the flowers; flowers generally in pairs larger than those of *spinosa*.

c. P. domestica—Linn. A small tree, branches without spines; leaves ultimately glabrous underneath, except on the midrib; flowers one inch across, appearing with the leaves.

(*a*) is certainly very common, and (*b*) moderately so; occasionally a specimen of what I take to be *domestica* occurs, but it is doubtful. The fact of all the characters given above being only the "usual" appearance of the plant has rendered it impossible for me to decide with any degree of certainty.

1865.	Ap. 16.	Ap. 21	1869.	Feb. 20	Feb. 27.
1866.	March 28.	Ap. 8.	1870.	Ap. 16,	Ap. 13. Ap. 10.
1867.	Ap. 7. Ap. 8.	Ap. 17.	1871.	Ap. 1,	March 30. Ap. 20?
1868.	March 29.	Ap. 1.			

2. **P. Avium** Linn. *Wild Cherry.*

Bab. 99. Hook 107. Benth. 137.
Hedges. T. April, May.

A tree producing few or no suckers. Leaves drooping. Flowers in umbels, collected round the leaf buds, calyx-tube contracted at the mouth.

Very uncommon. It is doubtful whether it is anywhere truly wild.

1865.	Ap. 16.	1868.	Ap. 12.
1866.	Ap. 18.	1869.	Ap. 12.
1867.	Ap. 19.	1870.	Ap. 25.

3. **P. Cerasus** Linn. *Dwarf Cherry.*

Bab. 100 Hook 107. Benth. 137.
Hedges. Sh. April, May.

Considered merely as a variety of the former by Hooker and Bentham, but not so by Syme and many others.

A shrub producing numerous suckers, leaves erect. Flowers in umbels scattered over the stem, calyx tube not contracted at the mouth. Inner scales of the flower bud leafy.

I.—Dead-man's Copse *J.J.P.*; near Ivy's Farm, *J.W.M.*
Wan's Dyke near Pewsey Road.
II.—Savernake Forest.
III.—Copse near Folly Farm; Rabley Copse.

1868.	Ap. 12.	1870.	Ap. 12.
1869.	Ap. 11.	1871.	Ap. 9.

2. Spiræa Linn.

Herbs with numerous rather small white flowers and numerous stamens, fruit of dry follicles containing few seeds.

The two species of this genus are not very dissimilar, though easily distinguished by well-marked characters.

Leaves of a few large leaflets with several smaller intervening ones, white beneath ... ... 1. Ulmaria.

Leaves of numerous rather small, deeply serrate leaflets, green beneath ... ... 2. Filipendula.

1. S. Ulmaria Linn. *Meadow-sweet.*

Bab. 100. Hook 108. Benth. 137.

Damp meadows and by water. P. June to October.

Stem two to four feet high, branched. Radical leaves often very long (one to two feet). Flowers white or cream coloured, in cymes, sweet scented, very numerous. Follicles five to nine, curiously twisted.

Common.

1865. June 18.
1866 bud June 6.
1867. June 23.
1868. June 2.
1869. June 13.
1870. June 11.
1871. June 25.

2. Filipendula Linn. *Dropwort.*

Bab. 100. Hook 108. Benth. 138.

Dry chalky pastures. P. June to August.

Root swollen at intervals into tubers. Stem one to two feet high, leaves chiefly radical, leaflets numerous gradually diminishing in size towards the stem. Flowers very like those of *S. ulmaria*, but often rather larger, tipped with red, not quite so numerous. Follicles not twisted.

Not common.

I.—Pewsey *T.F.R.*, Long's Penning, Overton *J.S.*

IV.—Rockley Downs *T.E.M.*

1865. nearly out, June 7.
1866. June 15 (cultivated)
1870. full fl. June 26.
1871. June 25.

3. Poterium Linn.

1. P. Sanguisorba Linn. *Salad Burnet, Small Burnet.*

Bab. 101. Hook. 119. Benth 148.

Dry chalky pastures. P. May to August,

Stems generally about a foot high, and either simple or very slightly branched; in rich soil, however, it occasionally reaches a height of two feet or more and is very much branched, leaves mostly radical, four to ten inches long, of numerous leaflets. Flowers in heads, the upper ones with pistils only, the lower ones with stamens only. Sepals four, the upper free parts falling off, the lower parts united and hardening round the achenes. Petals wanting, style long ending in a tufted stigma, red; stamens numerous with long filaments.

1865. Ap. 30.
1866. May 3.
1867. May 9.
1868. Ap. 25.
1869. Ap. 27.
1870. May 12.
1871. May 4.

4. Agrimonia Linn.

Stems hairy, erect, from one to three feet high, calyx tube contracted at the mouth and forming a ring from which hooked spines arise. Flowers in long spike-like racemes; petals dull yellow. Stamens from twelve to twenty. The two species are often united.

Calyx-tube furrowed to the base, spines spreading ... ... 1. Eupatoria.
Calyx tube not furrowed, outer spines reflexed ... ... 2. odorata.

1. A. Eupatoria Linn. *Agrimony.*

Bab. 101. Hook. 118. Benth. 149.

Fields and roadsides. P. June to Sep.

Stem rarely branched, from 12 to 18 inches high, hairy. Calyx-tube becoming woody in fruit.

Commonly distributed.

1865. By June 7.
1867. Bud June 10.
1868. June 19.
1870. June 11.

2. **A. odorata** Mill.

Bab. 101. Hook. 119. Benth. 149.

Waste places. P. June to Sep.

Stem taller and more branched than in *A. Eupatoria*. Calyx tube more bell-shaped, not furrowed, the outer spines bent back so as almost to touch the calyx. More scented than *A. Eupatoria*.

Not common, only as yet detected in I.

I.—West Woods, *J.S.*; Cadley; Ivy's Farm; Copse on Forest Hill near Pentawick; Brick-pits near the Pewsey Road; Clench; Martinsell; Pewsey, *T.F.R.*

5. Alchemilla Linn.

Tufted herbs with lobed leaves and green flowers. Petals wanting, achenes 1 or 2, enclosed in the dry calyx-tube. The two species are exceedingly dissimilar, and are even placed in different genera by some.

Perennial—Leaves not deeply lobed, flowers in spreading racemes (panicles) ... ... 1. vulgaris.

Annual—Leaves deeply divided, flowers very small, in small heads in the axils of the leaves ... ... 2. arvensis.

1. **A. vulgaris** Linn. *Lady's Mantle.*

Bab. 101. Hook. 118. Benth. 147.

Damp pastures and gravelly places. P. May to August.

Radical leaves broad, on long stalks, those on the stem similar but smaller. Stamens 4. Flowering stems from 6 to 18 inches high, flowers numerous in spreading clusters. Stipules rather large.

Not unfrequent.

1865. May 3.
1866. May 5.
1867. May 1.
1868. Ap. 29.
1869. May 11.
1870. May 13.
1871. By Ap. 25.

2. **A. arvensis** Linn. *Parsley Piert.*

Bab. 102. Hook. 117. Benth. 147.

Sandy and gravelly fields. A. March to June.

Stems from one to eight inches high, leaves deeply cut into 3 segments, segments wedge-shaped. Flowers very small, hidden by the bracts. Only one or two stamens bearing anthers.

Common.

"It appears to be wanting at Pewsey, there being no gravel there." *T.F.R.*

1865. By Ap. 20.
1866. March 17.
1867. Ap. 11.
1868. Ap. 4.
1869. By March 12.
1870. March 24.
1871. May 7.

6. Potentilla Linn.

Herbs of very similar habit—stems generally creeping. Calyx *double, i.e.*, of twice as many divisions as petals, the alternate ones outside the others and smaller.

Leaves pinnate... .. .. 1. anserina.
Leaflets 3, flowers white... ... ... 4. fragariastrum.
Leaflets 3 or 5, flowers yellow
Petals 5 in all or nearly all the flowers ... 2. reptans.
Petals 4 in all or nearly all the flowers ... 3. Tormentilla.

1. P. anserina Linn *Silver-weed.*

Bab. 103. Hook. 116. Benth. 145.
Roadsides and damp ground. P. May to Sep.

Stem creeping. Leaves pinnate green above, covered with shining white hairs underneath. Flowers solitary, rather large, rather pale yellow.

Common.

1865. May 12.
1866. May 21.
1867. May 16.
1868. May 5.
1869. May 12.
1870. May 12.
1871. May 8.

2. P. reptans Linn. *Creeping Cinque-foil.*

Bab. 103. Hook. 116. Benth. 144.
Roadsides and banks, P. May to Sep.

Stem creeping. Leaves stalked, leaflets 5, springing from the same point of the common leaf-stalk (*digitata*). Flowers solitary about as large as those of *P. anserina*, but of a deeper yellow. Carpels rough.

Not common.

1865. May 24.	1870. June 8.
1868. May 19.	1871. May 26.

3. **P. Tormentilla** Neal. *Tormentil.*

Bab. 103. Hook. 115. Benth. 144.

Barren pastures and heathy places. P. May to Sep.

Rootstock very thick and woody; flowering stems 6 to 18 inches long, annual, slender, procumbent or erect, branching in the upper parts. Radical leaves stalked, but generally decayed by the time the flowers appear. Stem leaves sessile or very shortly stalked; of three leaflets, the two side ones occasionally so deeply cut as to give the appearance of a leaf of five leaflets. Stipules large, deeply cut. Flowers small, yellow, petals 4.

Common.

1865. Ap. 29.	1869. May 5.
1866. May 9.	1870. May 15.
1867. May 8.	1871. May 7.
1868. May 7.	

4. **P. fragariastrum** Ehrh. *Barren Strawberry.*

Bab. 104. Hook. 117. Benth. 143.

Woods and Banks. P. Feb. to May.

Very similar to the *Strawberry* in its 3 leaflets and white flowers, but the whole plant is very much more delicate and covered with more silky spreading hairs. The receptacle does not swell into a pulpy mass as in the common strawberry and the sepals close over the carpels after flowering.

Abundant.

1865. Ap. 7.	1869. June 18.
1866. Feb. 17.	1870. March 16.
1867. Feb. 14.	1871. March 18.
1868. March 2.	

As with all the early spring flowers, the time of flowering is greatly influenced by the weather.

7. Fragaria Linn.

1. **F. vesca** Linn. *Strawberry.*

Bab. 104. Hook. 114. Benth. 142.

Woods, Thickets and Hedges. P. Ap. to June.

Rootstock with a terminal tuft of leaves, sending out numerous runners, which take root at intervals, where they form tufts of leaves more or less clothed with silky hairs. Leaves radical with 3 leaflets. Flower stalks 1 to 6 inches high, with spreading hairs, those on the branches pressed close to the stalk. Receptacle swelling into a pulpy mass.

Common.

1865. Ap. 21.
1866. Ap. 25.
1867. Ap. 17
1868. cult. Ap. 4, wild Ap. 23.
1869. Jan. 13, Feb. 23.
1870. March 29.
1871. Ap. 25.

8. Rubus Linn.

In studying the plants of this genus, it will be necessary to take into consideration the habits as well as the form and structure of the different species.

All the species throw out long, leafy shoots, directly from the roots, which (except occasionally in the Raspberry) do not flower the first year, and are otherwise different from the older stems of the plant; hence it is necessary, in order to secure a suitable specimen, to have both these new, as well as the older, stems represented. These new shoots are either

i. *suberect*—*i.e.*, nearly upright, but nodding slightly at the top.

ii. *erect-arcuate*—when they are nearly as erect as in the former species, but terminate in a knot, consisting of a number of closely-placed leaves, from which one or more slender shoots descend directly to the ground, where they take root.

iii. *arcuate*—*i.e.*, forming a lofty arch, the point of which pushes itself directly into the ground and takes root.

iv. *arcuate-prostrate*—when the stems form a very slight arch, and lie throughout the greater portion of their length quite close to the ground. In the autumn the stem rises so as to form a very low arch, and thus presents its point directly towards the earth, which it penetrates slightly and there takes root,

The stems have generally five bluntish angles, some are quite round, and some have the lower part round and the upper angular. They are clothed with *prickles* which in some species vary in size, gradually decreasing so as to become scarcely distinguishable from slender, rigid bristles (*aciculi.*) These again decrease in strength, and each becomes tipped with a gland, when they take the name of *setæ*, the setæ finally become transformed into hairs. The faces of the stem are often furnished with very shortly-stalked glands in some of those species which usually have neither setæ nor aciculi.

Some stems are hairless (*glabrous*), others have hairs either solitary and projecting from the stem, or two or three springing from the same spot and diverging, so as, if numerous, to interlace with those of the neighbouring clusters. In some cases there is more or less fine down, called *felt*, on the stem and leaves, whilst others have a kind of bloom, especially when young.

The above, which is taken by permission from Professor Babington's "British Rubi," is necessary for the explanation of the terms used, but there are many points of great interest connected with every other part of the plant, for which reference must be made to that work.

Of the 41 species into which Professor Babington divides the British Rubi, we have only eleven as yet properly detected, though it is very probable that several more will ultimately be discovered. The fact, however, of only fragments of the *flowering* stem being procured, renders it impossible to give names with any degree of certainty to most of the specimens brought in: may I, therefore, here request that those who bring me specimens of brambles, will bear in mind that portions of both the flowering *stems* (not only the flowering *shoots*) as well as of the barren stems are absolutely necessary for the determination of the name, and especial care must be taken that they are derived from the same individual plant.

Of the eleven species hitherto detected, one, the Raspberry, *R. Idæus*, is known at once by the *receptacle* to which the fruit is attached, not separating from the plant, but the drupels, when gathered, form a kind of miniature thimble. The barren stems are also *sub-erect*. The other species are not easily separated in all cases, and therefore the following tables are drawn up, one of which it is hoped may prove of use when others fail.

I.

All the ten species belong to only *two* sub-families—viz., *Villicaules* and *Cæsii*, those belonging to the former, moreover, belong to only three of the sections into which it is divided,—viz., *Discolores*, *Sylvatici*, and *Radulæ*. Notice will only generally be taken, therefore, of characters in which these separate divisions differ from one another.

i. Villicaules.—Stems angular, prickles numerous on the angles of the stem.

ii. Cæsii.—Stems round or slightly angular, prickles few, scattered over the stem, stems covered with a sort of bloom, especially when young.

The *Villicaules* are divided into three sections—

a. Discolores—prickles strong, equal, pubescence pressed close to the stem, leaves white-felted beneath.

b. sylvatici—prickles moderate, equal, hairs dense, spreading from the stem, leaves green beneath.

c. Radulæ—prickles nearly equal, also many short nearly equal aciculi and setæ, situated on tubercles. These aciculi and setæ fall off after a time, leaving the old stems rough like a file.

a. Of the *Discolores* we have but one species—2. *R. discolor.*

b. Of the *sylvatici* we have two species—

3. *leucostachys*—stems arcuate-prostrate, hairs on the stem loose and clustered, leaves grey-felted beneath.

4. *villicaulis*—stems arcuate, hairs on stem mostly solitary, often very many, leaves not felted beneath.

The panicle of flowers is also different in the two; in the former it is long and narrow with few branches, in the latter long and loose with many branches.

c. Of the *Radulæ* we have three species—

5. *pygmæus*—leaves not felted beneath, no gland-tipped hairs on stem.

6. *rudis*—leaves white-felted beneath, stems with gland-tipped hairs, leaves deeply and very irregularly toothed.

7. *Radula*—leaves green beneath, stems with gland-tipped hairs, toothing of leaves moderately fine.

Of the *Cæsii* there are four species—

8. *Balfourianus*—leaflets 5, stems glabrous, petals pale pink.

9. *Corylifolius*—leaflets 5, stems glabrous, petals white.

10. *tuberculatus*—leaflets 3, stems with gland-tipped hairs, petals pale pink.

11. *cæsius*—leaflets 3, stems glabrous, petals white.

These characters of *cæsii* will, however, not hold universally.

II.

Prickles numerous, stem angular

No gland-tipped hairs

Hairs adpressed, leaves white-felted beneath ... 2. discolor.

Hairs spreading, leaves green beneath

leaves grey-felted ... ... 3. leucostachys.

leaves not felted ... ... 4. villicaulis.

Gland-tipped hairs

Leaves not felted beneath ... ... 5. pygmæus.

Leaves felted beneath
Leaves finely toothed... ... ... 7. Radula.
Leaves coarsely toothed ... ... 6. rudis.
Prickles few, stem round
Gland-tipped hairs ... ... 10. tuberculatus.
Glabrous
Not glaucous, leaflets 5
Sepals spreading from the fruit ... ... 9. Balfourianus.
Sepals adpressed to the fruit ... ... 8. corylifolius.
Glaucous, leaflets 3 ... ... 11. cæsius.

III.

Leaves *white felted* beneath
(2) Discolor, (7) Radula, (6) rudis,
Leaves *grey-felted* beneath
(3) leucostachys, (8) corylifolius.
Leaves *green* beneath
(4) villicaulis, (5) pygmæus, (10) tuberculatus, (11) cæsius.
(9) *Balfourianus* has the leaflets apparently, but not really, felted beneath.
Petals *pink*—(2) Discolor, (3) Leucostachys, (4) villicaulis, (7) Radula, (9) Balfourianus, (10) tuberculatus.
Petals *white*—(5) pygmæus, or pinkish, (6) rudis, (8) corylifolius, (11) cæsius.

1. **R. Idæus** Linn. *Raspberry.*

Bab. 105. Hook. 109. Bab. Br. Rub. 42.

Hedges and bushy places. P. May, June.

Stem sub-erect round; prickles many, weak, purple. Leaflets 3 or 5, white-felted beneath. Petals narrow, white. Fruit separating from the receptacle.

Not uncommon in the hedges and on the commons about Martinsell, but otherwise a scarce plant.

1865. May 25.	1869. May 22.
1866. June 4.	1870. May 27.
1867. bud May 10.	1871. May 26.
1868. May 18.	1872. June 11.

The dates for 1866 and 1872, though late, are correct.

2. **R. discolor** W. & N.

Bab. 108. Hook 110. Bab. Br. Rub. 100.

Hedges and Thickets. P. June, July.

Leaflets white-felted beneath, with the edges turned down. Prickles strong—calyx reflexed, finely white-felted.

Very common in the hedges.

1865. June 11.	1868. May 19, June 11.
1866. June 6.	1869. May 22.
1867. June 15.	1870. June 20.

The above dates are, I believe, correct; but not having studied the Rubi till recently, I can only give the dates of those which, from the notes I took at the time, may be probably referred to this species.

3. R. leucostachys Sm.

Bab. 109. Hook. 111. Bab. Br. Rub. 113.

Stem round below, angular upwards, covered with loose spreading clustered hairs, and sometimes a few glandular ones. Panicle of flowers long, narrow, with few branches. Leaflets pale green and felted beneath, petals pink. Hooker says "leaflets often white below, petals often deep red."

II.—Between Savernake Forest and Martinsell (probably this species).

III.—Mildenhall.

4. R. villicaulis W. and N.

Bab. 110. Hook. 111. Bab. Br. Rub. 141.

This differs principally from *leucostachys* in the hairs (which are solitary, not clustered), in the panicle (which is loose and compound, with many branches) and in the leaflets not being felted beneath, though with long silky hairs on the veins. The only differences between the two, according to Hooker, are that *villicaulis* has pale petals and no glandular hairs; whilst *leucostachys* has sometimes a few glandular hairs and petals often deep red.

I.—Preshute.

5. R. pygmæus Weihe.

Bab. 113. Hook. 113. Bab. Br. Rub. 181.

Prickles many, very unequal, yellow, with a very slightly dilated purplish base. Leaves coarsely and irregularly doubly serrate, green above, paler but not felted beneath, hairy on the veins. Sepals with a slender point, felted, with many prominent setæ and aciculi. Filaments white, anthers purple.

Of this plant Hooker says "nothing is known satisfactorily."

III.—Axford.

6. R. rudis Weihe.

Bab. 114. Hook. 112. Bab. Br. Rub. 189.

Considered by Hooker to be but a variety of *Radula* "with stronger prickles and leaflets deeply and very irregularly toothed." The distinctions between the two are pointed out in the Tables.

I.—West Woods.

7. R. Radula Weihe.

Bab. 114. Hook. 112. Bab. Br. Rub. 194.

Aciculi and setæ many, unequal. Leaflets glabrous above, whitish and felted beneath. Panicle narrow, leafy, with many hairs, aciculi and setæ, felted. Petals notched; styles pink; sepals hairy, felted, with a slender point.

I.—Manton, June 24, 1870.

8. R. corylifolius Sm.

Bab. 118. Hook. 110. Bab. Br. Rub. 262.

Stems very nearly or quite glabrous with very few setæ or aciculi, glaucous, and with stellate down when young. Leaflets 5, generally 3 on the flowering shoot, hazel-like, basal pair sessile and overlapping the intermediate ones, whitish, hairy and felted beneath. Sepals densely felted over the back, bent back from the fruit, though often closing over the remains of an abortive flower. Petals white.

II.—Savernake Forest, June 24, 1870. Field near the Railway Station, Marlborough, June 11, 1870.

III.—Mildenhall, June 14, 1870. Rabley Copse.

9. R. Balfourianus Blox.

Bab. 118. Hook. 110. Bab. Br. Rub. 255.

Made a sub-species of *corylifolius* by Hooker, from which it is distinguished by the sepals being pressed closed to the fruit. Stems hairy with scattered spreading hairs, a few setæ and aciculi and glaucous bloom, round below but angular above. Leaflets apparently, but not really, felted beneath. Panicle with many spreading hairs, branches few flowered, one (usually the lowest) resembling and often nearly equalling the rest of the panicle. Petals pale pink.

I.—West Woods (a variety with hairs on the similating felt). Lane by the Brick pits on the Pewsey Road.

10. **R. tuberculatus** Bab.

Bab. 119. Hook. 112. Bab. Br. Bub. 280.

Stem with scattered hairs and setæ, reddish ; prickles numerous. Leaflets 3, rarely 5, dull-green, wrinkled and hairy above, palo green and very slightly felted beneath. Panicle short, leafy. Sepals clasping the fruit. Petals pinkish.

Considered as a variety of *R. dumetorum* by Hooker.

III.—Mildenhall.

11. **R.** Linn. *Dewberry.*

Bab. 119. Hook. 110. Bab. Br. Rub. 284.

A very variable species, but known by its prostrate round stems, covered with bloom ; prickles very slender, few and unequal. Leaflets, 3, coarsely serrate, green on both sides, sepals covered with felt, pressed to the fruit. Petals white.

Common.

1865. May 21.	1868. May 16.
1866. June 1.	1869. May 18.
1867. May 18.	1870. May 17.
	1871. May 21.

The localities mentioned in the first edition of the Flora of Marlborough, on the authority of Mr. Flower, are here omitted, as no specimens were preserved. Such specimens as I had by me were submitted to Professor Babington, who kindly corrected the nomenclature according to his "British Rubi," and the localities of these alone are given.

9. Geum Linn.

Herbs. Radical leaves pinnate with a large terminal leaflet. Calyx double. Style elongating after flowering, jointed and usually terminating in a hook.

Stem simple or nearly so ... ... 3. rivale.

Stem branched

Upper joint of style hairy ... ... 2. intermedium.

Upper joint of style glabrous ... ... 1. urbanum.

1. **G. urbanum** Linn. *Wood Avens.*

Bab. 122. Hook. 113. Benth. 189.

Hedges and thickets. P. April to September.

Stems branched erect, one to three feet high. Calyx of the fruit reflexed. Lower joint of the style much longer than the glabrous upper joint which ultimately ends in a hook. Flower yellow.

Common.

1865.	Ap. 25.	1869.	(Feb. Mch). Ap. 11. May 1.
1866.	By May 4.	1870.	May 12.
1867.	Ap. 26.	1871.	Ap. 25.
1868.	Ap. 12.		

2. G. intermedium Ehrh.

Bab. 122. Hook. 114. Benth. 139.

Damp woods. P. May to September.

Stems erect, branched. Calyx of the fruit spreading. Lower joint of the style larger than the hairy upper joint. Flower yellow, drooping. "Perhaps a hybrid between *urbanum* and *rivale*, or rather consists of extreme forms of both."

Not common. Copse on N.E. slope of Martinsell and near Pewsey.

1869.	May 15.	1871.	by May 9.

3. G. rivale Linn. *Water Avens.*

Bab. 122. Hook. 114. Benth. 139.

Damp woods. P. April to July.

Stems generally simple. Calyx of the fruit erect. Lower joint of the style equalling the hairy upper joint. Flowers purplish brown, drooping. Calyx purplish brown. After flowering the head of the fruit is raised upon a stalk (*carpophore*) nearly as long as the calyx.

Generally distributed—though not common.

I.—Copses round Martinsell.

II.—Great Bedwyn.

III.—Rabley Copse; Mildenhall Borders; Poulton Water Meadows, *F.E.T.*

1865.	Ap. 25.	1869.	Ap. 26.
1866.	Ap. 1.	1870.	May 18.
1867.	Ap. 12.	1871.	Ap. 25.
1868.	Ap. 12.		

10. Rosa Linn.

Climbing shrubs, usually prickly. The structure of the fruit, peculiar to this genus, is described in the general remarks upon the order. Syme observes

that though the fleshy sac which encloses the carpels is usually called the tube of the calyx, it is quite probable that it really consists of the excavated apex of the flower stalk.

Of the seventeen British species, only four have been as yet detected near Marlborough.

Leaves glandular beneath ... ... 1. tomentosa.
Leaves without glands
Styles distinct, quite included in the calyx 2. canina.
Styles united into a column, projecting ... 3. arvensis.

The fourth species *R. rubiginosa*, the Sweet Briar, has, I believe, been found in a copse on White Horse Down, but having grown in the shade, no flowers were found and the whole plant seemed so distorted that there is a doubt about its correct name.

1. **R. tomentosa** Sm.

Bab. 124. Hook. 121. Benth. 151. (*R. villosa.*)
Hedges: Sh. June, July.

Variable. Leaflets downy. Sepals copiously pinnate.

Probably not uncommon—though but few localities have been recorded.

I.—White Horse Down, *M.O.A.*; Oare, *F.S.*

II.—Bedwyn, *J.S.*; Chisbury, *J.S.*

III.—Rainscombe, *J.S.*; "halfway between Marlborough and Binck-Knoll," *J.S.*

1865. June 11.
1866. By June 23.
1868. June 10.
1870. June 17.
1871. June 4.

2. **R canina** Linn. *Dog-Rose. Briar.*

Bab. 128. Hook. 122. Benth. 151.
Hedges and thickets. Sh. May to August.

Very variable, but known by its hooked prickles, its glabrous (or nearly glabrous) leaves, its shoots without gland-tipped hairs and its styles free from one another.

Common.

1865. May 22.
1866. June 9.
1867. June 1.
1868. May 23.
1869. May 23.
1870. May 30.
1871. May 26.

3. **R. arvensis** Huds. *Trailing Dog-Rose.*

Bab. 126. Hook. 124. Benth. 152.

Hedges. Sh. June to August.

Somewhat similar to *R. canina*, but the prickles are hooked, the flowering stems purple, with a glaucous bloom. Leaflets more glabrous, flowers white, scentless, one to six together, rarely solitary.

Generally distributed but not common. More frequent in I.

1865.	May 24.	1869.	June 13.
1866.	Bud June 11.	1870.	June 14.
1868.	May 31.	1871.	June 24.

11. Crataegus Linn.

1. **C. oxyacantha** Linn. *White-thorn. Hawthorn.*

Bab. 126. Hook. 127. Benth. 155.

Hedges T. May, June.

A shrub or small tree with spinous branches; calyx and stalk glabrous or hairy. Flowers white, sweet-scented, in flat-topped clusters (corymbs).

Common. Plentiful in Savernake Forest, where it is allowed to become a tree.

1861.	May 15.	1869.	May 6.
1866.	May 7.	1870.	May 2.
1867.	May 14—31	1871.	May 14.
1868.	May 7.		

12. Pyrus Linn.

Trees or shrubs with the calyx adhering to the carpels, forming a *pome*. Only one species, *P. Malus*, can be considered to be at all indigenous. Another species, *P. Aria*, occurs in copses, but is very uncommon—a third species *P. Aucuparia*, the mountain ash, is very scarce, even as as cultivated plant.

Leaves simple green beneath ... 1. Malus.

Leaves simple, white beneath ... 2. Aria.

1. **P. Malus** Linn. *Crab Tree.*

Bab. 127. Hook. 125. Benth. 183.

Hedges and Woods. T. May, June.

Leaves serrate, flowers pink, in a sessile umbel. Two varieties, about equally common, occur

a. 1. *P. acerba De Cand.* young branches, calyx tube and under side of leaves glabrous—fruit drooping.

b. *P. mitis*, young branches, calyx tube and under side of leaves downy; fruit erect.

Occurs sparingly in all the divisions.

1865. April 25.	1869. April 26.
1866. May 7.	1870. Full May 19.
1867. May 7.	1871. April 16.

2. **P. Aria** Sm. *White-beam Tree.*

Bab. 127. Hook. 126. Benth. 154.

Chalky banks.

A tree, though frequently a mere shrub.

Leaves entire below, unequally and doubly serrate towards the end, green above, white beneath. Flowers white in loose corymbs.

I.—White Horse Down.

II.—Rainscombe, Axford, Mildenhall.

23. LYTHRACEÆ.

Of this Order we have but one representative about Marlborough, the more showy *Lythrum Salicaria*, which might have been expected to occur, not having been found within the limits assigned for the Flora.

1. Peplis Linn.

1. **P. Portula** Linn. *Water Purslane.*

Bab. 128. Hook 148. Benth. 164.

Damp places. A. July, August.

Stems creeping, angular, glabrous, from three to eight inches long. Leaves opposite, stalked. Flowers solitary, in the axils of the leaves. Calyx tube bell shaped, with twelve teeth. Petals six, pink, very small, often wanting.

Found in a pond near Clench Common in 1862, but not observed since.

24. ONAGRACEÆ.

The two genera to which the Marlborough plants of this family belong may be thus known.

Stamens 8, petals 4 ... ... 1. Epilobium
Stamens 2, petals 2 ... ... 2. Circea.

Herbs with alternate or opposite leaves, and flowers arranged in spikes or racemes. Petals four, pink or crimson. Ovary inferior.

1. Epilobium Linn.

Stems erect, producing suckers (stolons) or shoots near the root, by which very valuable characters are furnished, of great use in classification, but as many of them have to be examined at particular times of the year, they are not so generally useful to beginners. The leaves are generally scattered, in some species opposite or nearly so, especially on the lower parts of the stems. Ovary long, four celled, seeds numerous crowned with a tuft of silky hairs.

Seven species have been detected about Marlborough, which may be thus tabulated—

Flowers irregular, petals crimson ... ... 1. angustifolium.
Flowers regular
  Stigma four lobed
    Stem four to five feet high, leaves clasping the stem 2. hirsutum.
    Stem seldom above two feet high
      Leaves sessile, plants very hoary ... . 3. parviflorum.
      Leaves stalked, plants glabrous or slightly hoary 4. montanum.
  Stigma entire, club-shaped
    Stem with raised lines
      Leaves strap-shaped ... ... 5. tetragonum.
      Leaves tapering to a point ... ... 6. obscurum.
    Stem round ... ... 7. palustre.

1. E. angustifolium Linn. *Rose-bay, French willow.*

Bab. 130. Hook. 143. Benth. 158.

Damp shady places P. July to Sept.

Rootstock creeping. Stems erect, not branched, glabrous below, hoary above. Leaves lanceolate, shortly stalked. Flowers large and showy. Petals crimson, two lower smaller. Style bent downwards.

Very local.

I.—Wood near Martinsell, *H.M.H.*; Wilcot, *J.S.*
II.—Between Savernake House and Great Bedwyn, *J.J.P.*
IV.—Avebury, *F.E.T.*

2. **E. hirsutum** Linn *Codlins and cream.* *Great willow-herb.*
Bab. 130. Hook. 143. Benth. 158.
Wet places by ditches and streams. P. Aug. Sept.

Suckers thick, fleshy, with a few distant scales in the autumn. Stem erect, branched, woolly. Leaves clasping the stem. Flowers large, petals dark pink, notched.

Common.

1866. coming into fl. Aug. 22nd.

3. **E. parviflorum** Schreb. *Small-flowered hairy willow-herb.*
Bab. 130. Hook. 143. Benth. 158.
Damp places. P. July to Sept.

Similar to the former, but smaller in all its parts. The leaves are *sessile*, not clasping the stem, the lower ones shortly stalked.

Common, but not very abundant.

1870. July 6.

4. **E. montanum** Linn. *Broad-leaved willow-herb.*
Bab. 130. Hook. 143. Benth. 158.
Hedge-banks and shady places, old walls. P. June to Sept.

Stem round, downy, not much branched, from six to twenty-four inches high. Leaves broadly ovate, acute, toothed, shortly stalked. Buds nodding. Petals not more than twice as long as the calyx.

Generally distributed.

1865. June 5.
1866. June 13.
1867. June 14.
1868. June 1.
1869. June 8.
1870. June 4.
1871. June 16.

5. **E. tetragonum** Linn. *Long-podded square-stalked willow-herb.*
Bab. 131. Hook. 144. Benth. 159.
Damp places.

Stem glabrous or hoary with a short down, angular, from two or four raised lines running down from each side of the margin of the leaves, much branched,

one to two feet high. Leaves strap-shaped, the two edges running parallel to one another for a distance, rarely stalked. Capsule very long.

Railway bank near Marlborough Station.

6. E. **obscurum** Schreb. *Short podded square-stalked willow-herb.*
Bab. 131. Hook. 144. Benth.—
Wet places. P. Aug. Sept.

Considered by Bentham as merely a variety and by Hooker as a sub-species of the former. The stems of the two are similar, but the leaves of this species contract regularly from a rounded base, next the stem. The capsule is much shorter and on a shorter stalk. The *stolons* (or shoots from the base of the stem) are larger and produced earlier than in tetragonum.

Probably not very uncommon. Only detected last year (1871), when it was found at Mildenhall and Chiseldon.

7. E. **palustre** Linn. *Marsh Willow-herb.*
Bab. 131. Hook. 144. Benth. 159.
Bogs. P. Aug. to Sep.

Stem erect, curved at the base, round, not much branched, often with two lines of pubescence, one to two feet high. Leaves lanceolate, tapering at each end. Stolons (shoots) very slender with distinct pairs of leaves, produced in the summer.

Not common.

2. Circæa Linn.

1. C. **lutetiana** Linn. *Enchanter's Nightshade.*
Bab. Hook. 146. Benth. 161.
Damp wood and hedgebanks. P. June, July.

Rootstock extensively creeping. Stem erect, or decumbent at the base, round, swollen under the joints, usually glabrous, one to two feet high. Leaves ovate, on long stalks. Petals as long as the sepals.

I.—Wilcot, *J.S.*; Manton; Pewsey, *T.F.R.*

II.—Stone bridge Lane; St. Peter's Rectory Garden; Savernake; Bedwyn.

III.—St. Mary's Vicarage Garden, *H.H.W.*; Chiseldon; Binck-Knoll; Copse near Axford.

1865. About June 26. 1870. June 20.
1868. June 16.

25. HALORAGACEÆ.

1. Myriophyllum Linn.

1. **M. spicatum** Linn. *Feathered Water Milfoil.*

Bab. 133. Hook. 141. Benth. 181.

Ponds and ditches. P. June, July.

A glabrous aquatic herb; rootstock creeping extensively. The whole plant submersed, except the flowering stem. Leaves finely divided, in threes, fours, or fives. Flowers small, arranged in whorls along the flowering stem; upper usually males, the lower males, the intermediate often perfect. Calyx 4-cleft. Petals 4. Stamens 8. Styles 4. Fruit separating with 4 hard nuts.

In the Canal; and ponds near Joy's Farm, *T.N.H.*, and Pentwick.

26. CUCURBITACEÆ.

1. Bryonia Linn.

1. **B. dioica** Linn. *Red Bryony.*

Bab. 134. Hook. 148. Benth. 165.

Hedges. P. May to August.

Rootstock perennial. Stems very long, climbing extensively by means of tendrils, and rough with stiff hairs. Leaves large, five-lobed, rough on both sides. Male flowers three to eight together in racemes, female two to five together in umbels. Petals greenish yellow. Berry scarlet.

Not very common.

1865. May 26.	1869. May 22.
1867. June 7.	1870. May 23.
1868. Bud May 19.	1871. May 26.

27. PORTULACEÆ.

1. Montia Linn.

1. **M. fontana** Linn. *Water Blinks.*

Bab. 135. Hook. 84. Benth. 81.

Damp places. A. April, May.

An insignificant glabrous annual, forming tufts, from one to five inches in height. Leaves opposite. Flowers solitary or few together, calyx of two

sepals, corolla of 5 petals united at the base, the tube split to the base in front.

Probably more commonly distributed than is supposed. At present it has only been observed near the Savernake Cricket ground and on the top of Martinsell.

28. CRASSULACEÆ.

Herbs with very succulent leaves, usually alternate. Flowers in terminal racemes. Sepals and petals usually five, stamens ten, carpels five distinct.

The two genera occuring near Marlborough may be thus distinguished.

Sepals and petals 5, Stamens 10.	1 Sedum.
Sepals and petals 6—20, Stamens 12—40.	2 Sempervivum.

1. Sedum Linn.

But four species occur near Marlborough.

Leaves flat, flowers purple	1.	Fabaria.
Leaves very thick and short, flowers white	2.	album.
Flowers yellow	3.	acre.
Leaves awl-shaped, flowers yellow... ...	4.	reflexum.

1. **S. Fabaria** Koch. *Orpine. Live-long.*

Bab. 138. Hook 135. Benth 168 (*S. Telephium*).

Hedges and Thickets. P. Aug.

Stems erect, simple, one to two feet high, leaves scattered, fleshy, ovate, contracted into a stalk and coarsely toothed. Sepals five, short, petals five. Stamens ten.

Scarce, occurs in the West Woods; Rabley Copse; near Savernake House and near Elcott Mill (probably an escape in these two localities.)

2. **S. album** Linn. *White Stone-crop.*

Bab. 138. Hook. 137. Benth. 169.

Rocks and walls. P. June to Aug.

Stem five to ten inches, barren prostrate, flowering erect. Leaves short, thick, fleshy. Flowers in corymbs (so arranged that they shall form a flat topped bunch), petals white or pale pink.

Occurs on a wall at Poulton.

1868. June 12.

1869. bud June 16.

3. **S. acre** Linn. *Biting Stone-crop. Wall Pepper.*

Bab. 138. Hook. 137. Benth.

Walls and dry places. P. June, July.

Barren stems prostrate, flowering stems erect, four to five inches high. Leaves short, thick, fleshy; arranged in about six rows on the barren stems, scattered on the flowering ones. The whole plant sometimes assumes a yellowish hue. Flowers bright yellow or golden.

Not uncommon.

1865. June 10.
1866. Full June 20.
1867. June 15.
1868. June 2.
1869. June 11.

4. **S. reflexum** Linn.

Bab. 139. Hook. 138. Benth. 169. (*S. rupestre*).

Walls and Rocks. P. July.

Barren stems prostrate, flowering ones erect, six to twelve inches high. Leaves awl-shaped, acute, with a spur at the base. Flowers bright yellow, in a large cyme of four to eight branches with three to six flowers on each branch.

Not common. On an old wall at Overton and at Lookeridge.

2. Sempervivum Linn.

1. **S. tectorum** Linn. *Houseleek.*

Bab. 139. Hook. 139. Benth. 170.

Tops of walls. P. July.

Leaves thick, flat, arranged round the dense barren shoots, and along the flowering stems, which are one to two feet high. Flowers similar to those of Sedum, but the parts more numerous. Petals dull red-purple, with a green keel on the outside.

Occasionally on roofs. An introduced plant.

29. RIBESIACEÆ.

1. Ribes Linn.

Shrubs with alternate leaves, variously lobed. Calyx attached to the ovary below, the upper part divided into five segments. Corolla of five petals, small.

Stems prickly, stalks 1—3 flowered ... 1. Grossularia.
Stems not prickly, flower in racemes ... 2. rubrum.

1. **R. Grossularia** Linn. *Gooseberry.*

Bab. 140. Hook. 134. Benth. 171.
Hedges, doubtfully wild. Sh. March, April.

A much branched shrub, 3 to 4 feet high, with 1 to 3 spines at the base of each leaf, with 3 or 5 lobes, hairy. Apparently in branches, from the very short development of the branch. Flowers stalked, 1 to 3 in each bunch of leaves.

Occasionally in the hedges, especially near houses. An evident escape in most localities.

1865. Bud March 7.
1866. April 1.
1867. April 7.
1868. March 15.
1869. March 9.
1870. April 4.
1871. March 14.

2. **R. rubrum** Linn. *Red Currant.*

Bab. 140. Hook. 134. Benth. 171.
Hedges. Sh. April.

About the same size as *R. Grossularia*, but without any spines; leaf larger and thinner, with three to five lobes. Flowers in racemes. Petals pale green.

Like the former, occurs occasionally in hedges, but nowhere can it be considered wild.

1865. April 13.
1866. April 14.
1867. Full April 5.
1868. March 22.
1869. April 8.
1870. April 17.
1871. April 6.

30. SAXIFRAGACEÆ.

A very extensive order, but with only two genera represented near Marlborough. These differ considerably in habit and appearance.

Petals 0, plants growing in very damp places . 2. Chrysosplenium.
Petals 5, plants growing in dry spots ... ... 1. Saxifraga.

1. Saxifraga Linn.

The two species which occur near Marlborough are very similar in many respects. Both are covered with hairs, which are glandular in the upper part, a tuft of root leaves at the base of the solitary stems, a calyx adherent to the ovary, which is distinctly two-celled, each carpel ending in a rather long style, and 5 white petals. They are distinguished at once by their size and their roots.

Plant about 12 inches high, rootstock of small bulbs 2. granulata.
Plant 2—5 inches high, root fibrous ... ... 1. tridactylites.

1. S. tridactylites Linn. *Three-leaved Saxifrage.*

Bab. 144. Hook. 130. Benth. 176.
Old walls and dry banks. A. April to June.

Stem from one to five inches high, simple in small specimens, but much branched in larger ones, leafy. Stem-leaves generally wedge-shaped, with 3 lobes, sometimes entire, stalked; root-leaves entire, stalked. Calyx tube entirely adherent to the ovary, the free part being above it. Petals small, about twice as long as the calyx-segments.

Not uncommon on the Downs. Also on walls at Clatford, Mildenhall, and in Marlborough.

1865.	Ap. 20.	1868.	Mch. 14.	1871.	full bud Ap. 4.
1866.	Ap. 12.	1869.	Feb. 28.	1872.	fl. Ap. 23.
1867.	Ap. 11.	1870.	Ap. 17.		

2. S. granulata Linn. *Meadow Saxifrage.*

Bab. 144. Hook. 131. Benth. 176.
Dry pastures and banks. P. April to June.

Stem simple or slightly branched. Root-leaves kidney-shaped, more or less deeply notched and lobed, on long stalks. Stem-leaves few, smaller on shorter stalks, and with deeper divisions, uppermost entire, calyx adherent to the lower half of the ovary. Flowers very showy, petals at least three times as long as the calyx segments.

Abundant on the Downs, especially on Martinsell.

1865.	Ap. 30.	1868.	Ap. 25.	1871.	Ap. 24.
1866.	Ap. 25.	1869.	Ap. 20.		
1867.	May 4.	1870.	Ap. 27.		

2. Chrysosplenium Linn.

1. C. oppositifolium Linn. *Opposite-leaved Golden-Saxifrage.*

Bab. 145. Hook. 133. Benth. 178.

Damp shady places P. May, June.

A delicate plant, creeping extensively and sending up short flowering branches four or five inches high, simple or forked at the top. Leaves stalked, opposite, roundish, with a few scattered hairs on the upper surface, paler beneath. Flowers clustered and surrounded by leaves similar to those on the stem, but smaller and of a golden yellow. Petals 0.

Scarce—In one or two spots about New Mill and Wootton Rivers. Also at Chisledon and Brick-Knoll, *J.W.D.*

31. Umbelliferæ.

A very extensive order of herbs, known readily by their inflorescence. The flowers, as a rule, are numerous, several together, in umbels, *i.e.*, their stalks all springing from one point in the stem and so arranged that the outer ones are longer than the inner, thus causing all the florets to lie in a plane. The inflorescence consists of a compound umbel, *i.e.*, the flowers being arranged in numerous umbels and these *partial* umbels being so arranged as to form a compound umbel. About Marlborough there are only 23 species as yet detected, and to them alone the following remarks will necessarily apply. The similarity of the flowers and inflorescence has caused much attention to be paid to the seed in classifying the different species, but as a ripe seed is in almost all cases required for the purposes of classification, very little use is made of this character in the following Table, though a few remarks will be made on its structure.

The *root* is generally a *tap* root, *i.e*, a prolongation, as it were of the stem, such as carrots and parsnips. There are one or two varieties which may be noticed; in *Bunium* the root consists of a single tuber, to which the stem is fastened very slightly by a zigzag portion under ground; and *Œnanthe crocata* has large spindle-shaped tubers.

The *stem* is generally green and hollow, generally channelled, and of very varying height. *Chærophylla* and *Conium* have spotted stems.

The *leaves* may be classed into three varieties. (1). A *simple* leaf, deeply divided into lobes, (2) a *pinnate* leaf, consisting of leaflets arranged on each side of a common stalk, and (3) a *bi-pinnate* leaf, where each of the leaflets is replaced by another pinnate leaf, and a *tri-pinnate* leaf when each of these leaflets is often replaced by a pinnate leaf. The majority of the species have

leaves of this third kind, those belonging to the other two kinds being separated in the Table. The upper leaves are generally similar to the lower ones, though they are not unfrequently narrower in their leaflets; in *Helosciadium inundatum* the lower leaves are finely divided, whilst the upper ones are simply pinnate.

The *flowers* are generally white, with the petals very nearly or quite uniform: *Pastinaca* and *Silaus* have yellow flowers, and *Heracleum* and some others have the outer petals larger than the inner ones. Each of the partial umbels is surrounded by a ring of *bracteoles* or small leaves, the compound umbel being similarly furnished with *bracts*; the former is called an *involucel* the latter an *involucre*. Some species have neither involucren or involucel, and others have a sufficiently regular number to serve the purposes of classification, whilst others vary considerably in this respect. In the Table it has consequently been found necessary to repeat the same species occasionally, so as to include these cases of variation. The Table not only attempts to give the different genera, but even all the *species* that occur here, as the number of bracts is by no means constant in the same genus.

The *seed* is really the most important point to be attended to in classification. It consists of two carpels, attached to a central stalk and crowned with a fleshy disk; each of these carpels has five primary and four secondary ridges, sometimes well developed, at other times indistinguishable, and between these ridges are longitudinal channels *in* the covering of the carpel, filled with an oil, which gives the flavour to the seeds, as in caraway, &c. The carpels being generally very small, these ridges and channels (or *vittæ*) can only be seen under the microscope. In some few genera, the ridges are furnished with spines, which are easily seen even in the young fruit, and have therefore been used as characters in the Table. In one genus *Scandix*, the part above the seed is lengthened out into a long *beak*, many times the length of the seed itself.

Leaves simple, deeply divided into five parts ...	1.	Sanicula.	
Leaves simply pinnate			
All the petals similar or nearly so			
Bracts 0			
Bracteoles 0			
Flowers white	6.	Pimpinella.	
Flowers yellow	12.	Pastinaca.	
Bracteoles 3 or 4...	2.	Helosciadium (*inundatum*)	
Bracteoles numerous	2.	Helosciadium (*nodiflorum*.)	
Bracts 2 to 4	3.	Sison.	

Bracts numerous ... ... 7. Sium.
Outer petals much larger than the others ... 13. Heracleum.
Leaves twice or thrice pinnate
Stem with red spots
Stem solid, swollen below the joints ... 18. Chærophyllum.
Stem hollow, not swollen ... ... 19. Conium.
Stem green
Bracts 0
Bracteoles 0
Leaflets broad ... ... 4. Ægopodium.
Leaflets narrow ... ... 5. Bunium.
Bracteoles present
Water plants
Leaflets of lower leaves broad, plant erect ... ... 8. Œnanthe (*crocata*)
Leaflets of lower leaves narrow, plant floating ... ... 8. Œnanthe (*fluviatilis*).
Land plants
Fruit not prickly
Stem not furrowed
Bracteoles 3, long ... 9. Æthusa.
Bracteoles short ... ... 5. Bunium.
Stem furrowed
Plant 6 to 12 inches, beak very long ... 16. Scandix.
Plant 3 to 5 feet high... 17. Anthriscus.
Fruit prickly
Stem prostrate ... ... 15. Torilis (*nodosa*)
Stem erect ... ... 15. Torilis (*infesta*)
Bracts 1 to 3 *
Water plant ... ... 2. Helosciadium. (*nodiflorum*)
Land plants
Fruit prickly ... ... 15. Torilis (*infesta*)
Fruit smooth
Flowers yellow ... ... 10. Silaus.
Flowers white or pinkish
Beak very long ... ... 16. Scandix.
Beak none or very short

* In *Angelica* and *Helosciadium*, the involucre falls off after a time.

Leaves finely divided plant 1 to 2 feet ... ... 5. Bunium.
Leaflets broad plant 2 to 4 feet 11. Angelica.

Bracts several
Fruit prickly
Bracts deeply cut ... ... 14. Daucus.
Bracts awl-shaped ... ... 15. Torilis (*Anthriscus*)
Fruit smooth ... ... 8. Œnanthe (*crocata*)

1. Sanicula Linn.

1. **S. europœa** Linn. *Wood Sanicle.*

Bab. 151. Hook. 154. Benth. 186.

Woods and thickets. P. May to July.

Whole plant glabrous. Flowers mostly imperfect. The barren flowers shortly stalked, on the outside; fertile ones sessile, ovary covered with hooked prickles. Umbels of from two to eight rays, becoming very unequal in length. Bracts leafy, bracteoles narrow.

Common.

1865. May 3. 1868. May 19. 1871. May 4.
1866. May 7. 1869. April 29.
1867. May 15. 1870. May 18.

2. Helosciadium Koch.

1. **H. nodiflorum** Koch. *Procumbent Marsh-wort.*

Bab. 153. Hook. 156. Benth. 189.

Ditches and Brooks. P. July to Sep.

Stem creeping, rooting at the base. Leaflets ovate. Umbels opposite the leaves, on very short stalks. Involucre of one to three bracts, soon falling off involucel of numerous bracteoles.

Common.

2. **H. inundatum** Koch. *Lesser Marsh-wort.*

Bab. 153. Hook 157. Benth. 190.

Ponds. P. June to July.

Stems submersed, creeping, upper leaves pinnate with few leaflets; lower leaves divided into hair-like segments, umbel with two or three rays. Partial umbels very small, of five or six small flowers. Bracts 0, Bracteoles two or three, rarely five or six. Whole plant small, generally overlooked.

Very local, only at present known to occur in a pond on the top of Martinsell and in a pond near Chisbury, *J.S.*

1867. By June 20. 1869. June 10.
1870. Fl. and seed June 17.

3. Sison Linn.

1. S. Amomum Linn. *Stonewort.*

Bab. 158. Hook 158. Benth. 190.

Moist hedgebanks on a chalky soil.

Stem two to three feet high, glabrous, solid, with wiry branches. Lower leaves pinnate with ovate leaflets, finely serrated; in the upper leaves the leaflets are deeply cut, so as to be divided into narrow segments. Partial umbels and flowers small. Bracts and bracteoles two to four, the latter broader than the former.

Very scarce, found by *J.S.* in a hedge behind the "Ailesbury Arms" public house, near Clatford, Nov. 2nd, 1869. Could not be seen there in 1871.

4. Ægopodium Linn.

1. Æ. Podagraria Linn. *Bishop's weed, Gout weed.*

Bab. 153. Hook 160. Benth. 192.

Damp shady places. P. May, June.

Rootstock creeping extensively. Stem one to two feet high, glabrous, hollow, furrowed. Leaves two or three times pinnate. Umbels large, at the ends of the branches. Bracts and bracteoles 0.

Very generally distributed, especially in the neighbourhood of houses.

1865. By May 24. 1868. May 19.
1866. By June 1. 1869. May 27.
1867. June 5. 1870. May 27.

5. Bunium Linn.

1. **B. flexuosum** With. *Earth-nut. Pig-nut.*

Benth. 134. Hook. 161. Benth. 207.

Woods and pastures. *(Conopodium denudatum).* May, June.

Root a solitary tuber. Stem glabrous, from one to two feet high, with few branches. Root leaves few, decaying early, segments of leaflets very narrow. Petals not all uniform, bracts 0 or one to three, bracteoles 0 or one to seven.

Common.

1865. May 12.	1867. May 23.	1870. May 18.
1866. May 22.	1868. May 15.	1871. May. 7.
	1869. May 1.	

6. Pimpinella Linn.

1. **P. saxifraga** Linn. *Burnet-Saxifrage.*

Bab. 154. Hook. 160. Benth. 195.

Dry pastures. P. May to Oct.

Stem glabrous, round, solid. Leaves very variable, the lowest generally simply pinnate, with ovate leaflets; the upper, (and sometimes all) doubly pinnatifid with narrow segments, whilst the uppermost are reduced to little more than dilated sheaths.

Bracts and bracteoles 0.

Abundant.

1865. Ap. 23, May 16.	1870. Ap. 17, May 16.
1869. Ap. 16, May 15.	1871. May 9.

7. Sium Linn.

1. **S. augustifolium** Linn. *Narrow-leaved Water Parsnep.*

Bab. 154. Hook. 159. Benth. 194.

Ditches and wet places. P. July to Sep.

Rootstock creeping. Stem glabrous, erect, round, hollow. Leaves pinnate. Leaflets of the lower leaves oval and unequally serrate, of the upper lanceolate, deeply and irregularly cut. Umbels opposite the leaves, flowers white; Petals slightly irregular in the outer flowers. Bracts and bracteoles several, variable in shape, often cut.

Common.

8. Œnanthe Linn.

1. **Œ. crocata** Linn. *Hemlock. Water Dropwort.*

Bab. 156. Hook 165. Benth. 198.

Wet places. P. June, July.

Root of elongated tubers. Stem erect, glabrous, furrowed, hollow. Leaves twice or thrice pinnate; leaflets stalked, wedge-shaped rounded, deeply cut into three or five segments, those of the upper leaves narrower. Umbels large, on long stalks at the ends of the branches. Bracts 0 or few, bracteoles several. The juice of stem and roots turns yellow when exposed to the air.

Generally distributed.

1866. June 6. 1869. May 30.
1867. June 8. 1870. June 6.
1868. By June 2.

2. **Œ. fluviatilis** Colem.

Bab. 157. Hook 166. Benth. 190.

Œ. Phellandrium.

Streams. B. or P. July.

Stem floating, the flowering part alone rising out of the water, "well marked by the submersed leaflets being divided into finger-like acute broadly linear parallel segments, deeply cut at the end." Bracts 0, bracteoles several.

Bedwyn, *J.S.* and *F.E.T.*

9. Æthusa Linn.

1. **Æ. Cynapium** Linn. *Fool's Parsley.*

Bab. 157. Hook. 166. Benth. 199.

Cultivated land. A. May to Sep.

Stem round, glabrous, hollow, from six to eighteen inches high. Leaves twice or thrice pinnate, umbels on long stalks, bracts 0 (very rarely one), bracteoles three, long, pendulous, situated on the outside, by which character this plant may be at once known, whole plant dull green, fetid when bruised, poisonous.

Common.

1865. May 19. 1869. Bud May 1. 1871. May 12.
1867. May 25. 1870. June 11.

10. Silaus Besser.

1. **S. pratensis** Bess. *Pepper Saxifrage. Sulpher-wort.*

Bab. 158. Hook. 166. Benth. 201.

Damp meadows and pastures. P. June to July.

Stem angular, glabrous, furrowed, solid, one to two feet high, not much branched. Leaves three or four, pinnate, the ultimate divisions narrow. Leaves mostly radical, decreasing upwards. Umbels not large, at the ends of the branches. Flowers pale yellow. Bracts one or two, bracteoles several.

Generally distributed.

1869. June 6. 1871. June 1.
1870. June 11.

11. Angelica Linn.

1. **A. sylvestris** Linn. *Wild Angelica.*

Bab. 158. Hook. 167. Benth. 203.

Damp places. *P.* July.

Stem round, hollow, glabrous below, downy above, green or purplish, from two to four feet high, or even more. Lower leaves very large, twice pinnate, their stalks much expanded at the base. Upper leaves gradually smaller, till they are often little more than a large sheath, enclosing the young umbels. Leaflets generally ovate, though varying in shape, sharply toothed. Umbels large, at the ends of the stems. Flowers white or pink. Bracts two or three, falling off; bracteoles several.

Generally distributed.

1867. Bud May 16. 1869. June 10.

12. Pastinaca Linn.

1. **P. sativa** Linn. *Parsnep.*

Bab. 159. Hook. 168. Benth. 205.

Hedgebanks on a chalky soil. *B.* Ap. to Sep.

Stem angular, hairy, hollow, furrowed, from two to three feet high. Leaves pinnate, generally shining above, downy beneath. Leaflets oval, terminal one more or less lobed. Umbels of from six to twenty stout rays. Flowers yellow. Bracts and bracteoles 0.

Generally distributed but not very common.

1865. June 27. 1869. Feb. 16, May 12.
1866. Full bud, May 13. 1870. Ap. 19, May 26.
1868. May 10, June 19. 1871. Ap. 2, May 26.

13. Heracleum Linn.

1. **H. Sphondylium** Linn. *Cow Parsnep. Hog-weed.*

Bab. 159. Hook. 169. Benth. 205.

Meadows, hedges and thickets. *P.* May to Sep.

Stem angular, hairy, hollow, furrowed from two to four feet high. Leaves pinnate. Leaflets variously lobed, hairy. Umbels large, flat. Flowers white or pink; outer petals much longer than the others. Bracts 0 or few, soon falling. Bracteoles numerous.

Very common.

1865. Jun. 3.	1868. May 3.	1871. May 5.
1866. May 4.	1869. Ap. 20, May 1.	
1867. May 11, June 4.	1870. May 16.	

The variety *H. augustifolium* Sm. with much narrower leaflets is not uncommon.

14. Daucus Linn.

1. **D. Carota** Linn. *Wild Carrot.*

Bab. 160. Hook. 170. Benth. 211.

Borders of fields and dry places. *B.* June to Sep.

Stem round, hairy, solid, furrowed, from one to two feet high. Leaves twice or thrice pinnate, the ultimate segments very narrow. Umbels large on long stalks, flowers white, the central one often being dark red. After flowering the outer rays of the umbel, which are longer than the inner ones, close over so as to give a cup-shaped or even egg-shaped appearance to the umbels. Fruit prickly. Bracts and bracteoles several, generally cut into three or eight narrow segments.

Common.

1865. June 12.	1868. May 16.
1866. May 26.	1869. May 12.
1867. June 16.	1870. June 11.

15. Torilis Adans.

1. **T. Anthriscus** Gaert. *Upright Hedge Parsley.*

Bab. 160. Hook 171. Benth. 209 (*Caucalis*).

Hedges and dry banks. A. June to August.

Stem erect, round, solid, wiry, rough with scattered stiff hairs, not much branched from one to three feet high. Leaves twice pinnate, hairy. Umbels on long stalks at the ends of the branches, at first drooping. Fowers white or reddish. Carpels covered with bristles not hooked at the tip. Bracts and bracteoles several, one under each of the outer rays.

Not uncommon.

1865. Bud June 12. 1868. June 14.
1866. June 4
1867. Bud June 14. 1870. June 21.

2. **T. infesta** Spr. *Field or spreading Hedge Parsley.*

Bab. 161. Hook 171. Benth. 210. (*Caucalis*).
Fields. A. July, August.

Stem erect, angled, solid, wiry, sparingly hairy, much branched from six to eighteen inches high. Leaves twice pinnate, hairy. Umbels on long stalks, at the end of the branches, rays two to eight; flowers white or reddish, carpels covered with numerous hooked bristles. Bracts one or 0, bracteoles numerous.

Generally distributed, but not abundant.

3. **P. nodosa** Gaert. *Knotted Hedge parsley.*

Bab. 161. Hook. 171. Benth. 209 (*Caucalis*).
Dry banks. A. June, July.

Stem procumbent, angled, solid, about a foot long. Leaves twice pinnate, hairy. Umbels on very short stalks, opposite the leaves, small, nearly globular. Flowers white or reddish, carpels covered with hooked bristles, inner ones often wanted. Bracts 0, bracteoles several.

Very scarce, on the side of the Bath road about a mile from Marlborough, *J.W.P* and *G.F.K.*

1867. By June 18. 1869. Full bud May 29.

16. Scandix Linn.

1. **S. Pecten-Veneris** Linn. *Venus' comb. Shepherd's Needle.*

Bab. 161. Hook. 161. Benth. 206.
Fields. A. May to August.

Stem erect, round, solid, furrowed, hairy, branching from the base, from six inches to a foot or more high. Leaves three times pinnate. Umbels of two or three rays, at the ends of the branches. Flowers white, petals of the

outer flowers (which alone ripen seeds), not unfrequently rather irregular. Fruit with a very long beak, about two inches long, hairy on the ribs. Bracts 0, bracteoles several, sometimes much divided.

Common.

1865. Ap. 25.
1866. May 9.
1867. Ap. 23.
1868. May 13.
1869. Ap. 20.
1870. Ap. 24, May 6.
1871. May 12.

17. Anthriscus Hoffm.

1. **A. Sylvestris** Hoffm. *Wild Chervil. Cow Chervil.*

Bab. 161. Hook. 162. Benth. 208. (*Chærophyllum.*)

Hedge-banks and Woods. P. April to June.

Stem erect, round, furrowed, hollow, hairy below but glabrous above, swollen below the joints (especially when old), from three to five feet high. Leaves twice pinnate, shining. Umbels on long stalks, at the ends of the branches, drooping at first. Flowers white. Bracts, 0, bracteoles several, ovate.

Very common.

1865. Ap. 21.
1866. Ap. 13.
1867. Ap. 13.
1868. March 11, 30.
1869. Feb. 14, 24. Ap. 3
1870. Mar. 30, Ap. 25.
1871. March 21.

18. Chærophyllum Linn.

1. **C. temulum** Linn. *Rough Chervil.*

Bab. 162. Hook. 162. Benth. 208.

Hedge-banks. P. May to July.

Stem erect, round, grooved, solid, rough below, hairy near the top; swollen below the joints, spotted with red, from three to four feet high. Leaves twice pinnate, hairy. Umbels stalked, at the ends of the branches, drooping at first. Flowers white, petals somewhat unequal. Bracts 0, bracteoles 5 or 6.

Common.

1865. May 26.
1866. Bud June 11.
1867. May 25.
1868. May 16.
1869. May 27.
1870. June 2.
1871. May 28.

19. Conium Linn.

1. C. maculatum Linn. *Hemlock.*

Bab. 163. Hook. 154. Benth. 211.

Hedge-banks and waste places. B. July, August.

Stem erect, round, hollow, glaucous, spotted with purple, branched, from three to five feet high, fœtid when bruised. Leaves thrice pinnate, glabrous. Umbels at the ends of the branches. Flowers white, Bracts and bracteoles several, the latter on the outside only of the partial umbels.

Scarce. Appearing only occasionally.

1867. Bud June 6. 1869. June 9 (Calne.)

32. HEDERACEÆ.

1. Hedera Linn.

1. H. Helix Linn. Ivy.

Bab. 164. Hook. Benth. 213.

Rocks, old walls, and trees. Sh. Sep. and Oct.

An evergreen climber with thick dark shining leaves, and climbing by means of root-like fibres. Leaves very variable, ovate and more or less lobed, those of the flowering stems, ovate or lanceolate. Flowers yellow. Berry black.

Commonly distributed.

1865. Sept. 19. 1868. 1871. About Sept. 18

1866. Sept. 26. 1869. Oct. 3.

1870. Sept. 16.

33. CORNACEÆ.

1. Cornus Linn.

1. C. sanguinea Linn. *Dog-wood.*

Bab. 164. Hook. 172. Benth. 215.

Hedges and thickets. Sh. June to July.

A shrub about five or six feet high, branches numerous, covered with a short down. Leaves opposite, ovate, covered when young with silky hairs, midrib very distinct as well as three or four pairs of veins which spring from the lower half of the midrib. Flowers in flat-topped clusters (cymes), petals creamy white. Fruit black.

Common.

1865. May 14, June 4. 1868. May 27. 1871. June 5.

1866. May 21, June 19. 1869. May 31.

1867. June 16. 1870. May 26.

In publishing this second part of the Flora of Marlborough, I have endeavoured to obviate the necessity of a glossary, or at least of using any words not to be found in the glossary appended to part 1; consequently the descriptions are occasionally longer than would otherwise have been the case.

My thanks are especially due to C. C. Babington, Esq., F.R.S., Professor of Botany in the University of Cambridge, for much valuable help, and more especially when absence from England prevented my examining the proofs of a portion of the Flora.

T. A. PRESTON.

REPORT

OF THE

MARLBOROUGH COLLEGE

Natural History Society.

FOR THE

HALF-YEAR,

ENDING CHRISTMAS, 1872.

"TUM MIHI NATURÆ LIBEAT PERDISCERE MORES:
QUIS DEUS HANC MUNDI TEMPERET ARTE DOMUM."

MARLBOROUGH:
PRINTED BY C. PERKINS, TIMES OFFICE.
1873.

D.28.12.88

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C. B. Vaughan.

Curator and Librarian:
R. W. Doyne.

Sub-Treasurer:
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A. H. G. Skrine		

Associates:

T. N. H. Smith J. H. W. Lee

PREFACE.

In issuing our Report for the past Half-year, whilst wishing that we could feel that more energy had been displayed by the members of the Society, we have yet some hopes that a change for the better may take place next year. We cannot complain of a falling off from what was the case during the first half of 1872, because the Entomological and Botanical Reports will still shew a fair amount of work done, but we certainly cannot compliment the Society for having exhibited any *increased* amount of energy—in fact the attendance at meetings has generally been very unsatisfactory; but as our true workers have shewn no disposition to relax their efforts, we can only hope that we may secure more next year. We stated that we have reasons for indulging in these hopes—our entomological section has still its excellent Head to take the lead in this branch. The Botanical section, though suffering great loss in the departure of Mr. Sowerby from the School, will, we venture to say, still be as energetic as ever, as we may still look for his aid, besides having that of Mr. Thompson, Mr. Sterr, Mr. De Lisle and others; and we may hope that the Ornithological section under the guidance of E. im Thurn, Esq., will again appear as an integral part of the Society. The Society may congratulate itself upon having his aid again, and we cannot here avoid alluding to the exceedingly liberal offer which he has made. In addition to remodelling the Ornithological collection and making it more practically useful, Mr. im Thurn intends to incorporate with it his own extensive collection, so that we may regard our Ornithological section as one which ought to do great things. May the next year give us reason to consider that our expectations will be realised and a due appreciation exhibited of this most liberal donation. As regards the

Geological section we regret to say that it is nowhere. Perhaps no section has had more money spent upon it, and yet we cannot keep a Geological section going: until we can secure a more permanent Head, we fear it will be useless to expect any great results. In fact, it is just this very difficulty which has to be encountered every year in almost all the sections; the moment we get a really efficient Head from among the members of the School, he is called away and very rarely can we at once find another one equally efficient to take his place.

The efforts of the Committee have been devoted to an improvement of the Museum. The present one, in addition to being used as a class room and being very dark, is now getting too small and our cabinets have to go wandering about the room. At present no better arrangement can be made than that of removing the Botanical and Miscellaneous collections into the temporary Museum in the Old House, and thus leaving the Museum proper to be devoted to Geology and Ornithology. It must, however, be remarked that this is but a make-shift. Until we get a room specially devoted to the purpose, and if possible better lighted, we cannot hope to have our collections so well exhibited or studied as we could wish.

The latter part of the present Report, and one which we venture to say will form a very valuable and interesting part of the Report, is occupied by a catalogue of our Antiquities, kindly drawn up by F. E. Hulme, Esq., F.S.A., &c., to whom our thanks are especially due for his unvarying interest in the Society, and to whom we are indebted for the excellent plates which appear in our Reports.

The new arrangement of three terms instead of two half-years will probably be advantageous to the Society in many ways, though not so in all. We propose publishing two Reports annually as we have hitherto done, at Midsummer and Christmas, the former of which we venture to hope will exhibit more than the usual amount of *practical* work, the latter of the *results* of that work.

It only remains for us to return our sincere thanks to all who have aided us. Among those not directly connected with the College we may mention

Mr. Gauntlett, Rev. C. Scames, Mr. Perkins, and Rev. A. E. Dayman. Among Old Marlburians, H. C. Spry, Esq., Capt. R. B. Reed, C. W. Houghton, Esq., C. W. Everard, Esq., and H. A. Evans, Esq.; and among those still with us, G. F. Rodwell, Esq., F.C.S., &c., W. Fergus, Esq., M.D., and W. O'N. Lindesay. To one and all we return our hearty thanks for the kindly interest they have shewn, and which we trust will be duly appreciated in the ensuing year.

RULES.

1.—That this Society be called the Marlborough College Natural History Society.

Constitution.

2.—That the Society consist of Members, Honorary Members, and Associates.

Officers.

3.—That the Officers of the Society consist of a President, Secretary, Treasurer, and Librarian, to be elected from and by Members of the Society.

Election of Officers.

4.—That those Members of the Committee, who are not ex-officio Members, be elected half-yearly, and that the retiring Members be eligible for re-election.

5.—That the same rule apply to the Librarian and Treasurer.

6.—That each candidate for election give in his name to the President, any time before the day of election.

7.—That all canvassing for votes by a Candidate, or by his friends with his knowledge, shall at once disqualify him for any election that half-year.

8.—That any member canvassing for votes for a Candidate, or for a new rule, forfeit the right to vote on any occasion during that half-year.

9.—That the election shall take place at a meeting held as soon as possible after the return of the School, the old officers remaining in office until the fresh elections are held.

10.—That eight Honorary Members have the power of debarring a candidate from standing for any office.

Management.

11.—That the affairs of the Society be conducted by a Committee, consisting of the President, Secretary, and three other Members of the Society, to be elected from and by Members of the Society; three of whom shall form a Quorum.

President.

12.—That in case of an equality of votes, the President shall have a double or casting vote.

13.—That in the absence of the President, the Committee be empowered to request any Member of the Society to take the chair.

Committee.

14.—That on the occurrence of any election, each Member of the Committee have double the number of votes of any other Member of the Society.

Secretary.

15.—That the duties of the Secretary be to keep a list of all the Members of the Society, and of all former Members and Benefactors who may wish to receive the Reports of the Society; to summon meetings (when necessary) of the Society; to keep a detailed report of the proceedings, as well as lists of Members and Visitors present at each meeting, and generally to act under the direction of the Committee in all matters connected with the welfare of the Society.

16.—That in the absence of the Secretary from any meeting of the Society, minutes of the proceedings be taken by a member of the Committee, appointed by the President.

Treasurer.

17.—That the duties of the Treasurer be to collect all sums of money due to the Society; to receive all donations of money; and to disburse all sums payable by the Society out of the funds entrusted to him.

18.—That the Treasurer furnish half-yearly a detailed account of the receipts and disbursements to be audited by the Committee.

19.—That the funds of the Society be placed in the College Bank, and that no money be withdrawn by the Treasurer without the signature of the President to the order; or in his absence, that of the Secretary.

Librarian.

20.—That the duties of the Librarian be to keep a catalogue of the Library, with the names of the Donors; to see that the Library Regulations are carried into effect; to be responsible for the order of the Museum, and when necessary to assist the Secretary in the distribution of the Reports of the Society.

Library.

21.—That any Member of the Society be at liberty to consult any of the books belonging to the Society, but that only certain volumes, to be decided on by the Committee, be allowed to be taken from the room.

22.—That if any Member wishes to take a volume from the Museum, he shall give his name, and the name of the book, to the Librarian, who shall enter them in the book kept for the purpose.

23.—That every volume so taken out be returned by the end of the quarter, but that no book be kept more than one month.

24.—That if any volume be damaged, such damage shall be reported by the Librarian to the Committee, who shall decide upon any further proceeding in the matter.

Museum.

25.—That any Member of a section, who is not a member of the Society, be allowed access to the Museum at such times as it is open to Members of the

Society generally, provided he first obtain leave from the President, which leave shall be renewed every quarter, but may be taken away at any time, if the privileges be abused in any manner.

26.—That the same privileges be extended, under the same conditions, to such other Members of the School who may wish to use the Library and Collections for the purposes of study, provided there be a reasonable excuse for their not belonging to a section.

27.—That in all cases the Museum be used for the study of Natural History alone, and not as an ordinary Reading Room, except on Sundays.

Botanical Garden.

28.—That the Garden be under the complete control of the President, or of some person appointed by the President.

29.—That the Garden be open to Members of the Society, at all times, except on Sundays, but not to Visitors.

30.—That any Member on application to the President can have the charge of a bed.

31.—That no plants be put in without special leave from the President.

32.—That Members may keep any plants of their own in such places as the President shall appoint, as long as the ground is not required.

33.—That the Society's flowers may not be picked.

34.—That Members may gather from their own plants, but may not depute others to do so.

Members.

35.—That the election of new Members rest entirely with the Committee.

36.—That every Member pay a half-yearly subscription of 2s. 6d., to be paid at the first meeting of the Society in that half-year.

37.—That if a Member be elected at, or after the Quarter, he shall only pay 1s. on Election.

38.—That Members have the right to be present, to state their opinions, and to vote at all general meetings of the Society; to introduce a visitor at all general meetings of the Society; to have personal access to the Museum at all times; and to introduce a visitor at such times, as shall seem fit to the Committee.

Honorary Members.

39.—That Honorary Members have all the privileges of Members, except the power of introducing a member of the School to the meetings of the Society.

40.—That Honorary Members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

41.—That Honorary Members may compound for all future subscriptions by the payment of a sum of two guineas.

Associates.

42.—That Associates be confined to members of the VIth or Upper Vth Forms; that they pay 1s. 6d. a half-year, and be entitled to the use of the Museum, and to attend the meetings of the Society whenever they think fit, but shall not be entitled to vote on any question, to introduce a visitor, or to take books out of the Museum.

Visitors.

43.—That on such occasions when the number of those who wish to be present as visitors at the general meetings of the Society is greater than the number of Members who attend, the President and Committee shall be empowered to admit two or more each, as shall seem fit.

Suspension of Members.

44.—That any Member be liable to be excluded from the Society by the Committee if, in their opinion, he shall have failed to show sufficient energy in the working of the Society.

Sections.

45.—That sections be formed for the more accurate study of the different branches of Natural History, and that the Heads of these sections be chosen by the Committee half-yearly from Members of the Society.

46.—That these sections shall hold meetings as often as shall seem fit to the Heads of the several sections, at which any Members of the school, with the sanction of the Head of that section, may attend.

Meetings.

47.—That ordinary meetings of the Society be held once a fortnight, but that the Secretary be empowered to call extraordinary meetings when necessary.

New Rules.

48.—That any Member of the Society have power to propose any new rule or any alteration in an old one, provided the motion be seconded by another Member.

MEETING HELD AUGUST 30TH, 1872.

A paper was read by G. F. Rodwell, Esq., F.C.S., F.R.A.S., on "The History of Chemistry." The Vice-President, Mr. Babington, then exhibited a pair of stuffed white Pheasants, presented by Mr. Gauntlett, of Savernake Forest.

There were 23 persons present, 3 Hon. Members, 14 Members, and 6 Visitors.

MEETING HELD SEPTEMBER 13TH, 1872.

F. E. Hulme, Esq., F.L.S., F.S.A., gave a description of "Various Methods of Nature-printing."

Mr. Babington announced that E. Bryans, A. D. Stallard, and H. S. Smith had been elected members, and alluded severely to the small attendance at meetings this half-year, adding that the Committee had decided provisionally (till Mr. Preston's return) that they would be willing to take five Visitors each to a meeting.

E. Meyrick passed round a list of Entomological Notices, forming part of those taken during the holidays, and exhibited some cocoons and eggs of the Shanting Silk-worm Moth, sent by C. W. Everard, Esq., (O.M.) from Chefoo.

J. B. Oakeley passed round a list of Ornithological Notices, and mentioned that a Merlin had been caught in the College Grounds, by H. A. Evans, Esq.

There were 21 persons present, 4 Hon. Members, 13 Members, and 4 Visitors.

MEETING HELD SEPTEMBER 27TH, 1872.

H. S. Sankey read the following paper on

THE CULTURE AND EMPLOYMENT OF THE HOP PLANT.

BEFORE I begin to read this paper, I must apologise for the unscientific way in which I am about to treat the subject; the little I have to say is taken from personal observation. To some here to-night no doubt the hop is familiar, others perhaps, owing to the local partiality of the plant, have never even seen it. Owing to the important part hops play in the manufacture of our national drink, *Beer*, they form a by no means inconsiderable item of agricul-

tural growth; about 58,000 acres are under cultivation in England alone. Till 1862 a heavy duty was imposed on them, the average payment from 1852—62 being about £300,000 from about 80,000 acres of land under cultivation: about one-sixth of the produce was exported. This year it is thought there will be a produce of somewhere about 600,000 cwt. of hops, equal to £300,000 old duty, being more by about 80,000 cwt. than the brewers will want this year. Germany, Belgium, and France, will send their surplus here, and on the other hand America will require a quantity of hops from England

The plant is indigenous, but was introduced for the purposes of cultivation from the Netherlands in the reign of Henry VIII, the exact date is said to have been 1524. No sooner was it heard of than the prejudice of the times drove it back again, the anathemas of Parliament were invoked, Parliament denounced it as a wicked weed corrupting the taste of the people, and its use was prohibited four years after its introduction.

Not long after, its cultivation was revived again in England, but the amount produced did not suffice for the supply of the kingdom till the end of the 17th century. The hop (*Humulus Lupulus*) is a perennial dicecious plant, of the same natural order as the hemp and nettle. It has long rough twining stems, and stalked 3-5 lobed leaves. The female flowers are in strobiles or cones with large scales, which further enlarge like fir cones do, after the fertilisation of the ovule by the pollen from the staminiferous male flowers falling on it. The male flowers, after performing this office, wither away and are of no further use. The dried female cones constitute the Hop of Commerce.

The value of these cones consists in a little nut-like fruit, not larger than a grain of mustard seed, contained under each scale. In this little nut is a small quantity of peculiar granular substance called *Lupuline*, in which consists the virtue of the hop. Lupuline is sedative, narcotic, and contains tannic acid and a peculiar aroma that is found nowhere else, hence pillows are often stuffed with hops and used for mania and sleeplessness: lupuline is also occasionally used in medicine for stomachic complaints.

To turn now to the *cultivation* of the plant. It requires a very rich, mellow, and carefully prepared soil, and will only grow in a few places. The gardens lie chiefly in Kent, Sussex, and Herefordshire, though there are a few in Worcestershire, Hampshire, Essex, Surrey, Gloucestershire, and even Wilts. Abroad they are cultivated in Germany, France, Flanders, Southern Russia, North America, Australia, and lately in New Zealand. The soil they are to be planted in must be a rich loam, with a sound, dry, and deep subsoil, rich old pasture grounds make very good hop gardens: they should only be exposed to the south, any cold wind has a great effect on them; to prevent this thick screens of 20ft. poles are placed round the garden, the interstices being filled with climbing hops. The ground they are to be placed in must be very carefully

prepared, it is generally cleaned by a succession of green crops, and then exceedingly richly manured with rotten dung.

The plant may be raised from seed, but young shoots are more usually planted. Among the varieties of the hop are the Hill Golding, the East Kent Golding, Golden Hops, Jones' Hops, Grape hops, and Farnham White Bine, Colgates, and Wild Hops. The Canterbury Whitebines and the Goldings are grown principally in East Kent, and are used for the best pale ales; no other sort will keep beer for exportation, they consequently realize the top price; while some varieties are selling for 50s. per cwt., these latter will fetch £6 or £7 per cwt., but of course the price varies according to the quantity grown.

The ground, prepared as we said above, is now divided into parallel lines about 6ft. apart, and in these at an interval of 6ft. holes are dug, which are filled with dung, lime, and earth; in this three shoots are planted triangle-wise: a stick about 4ft. long is then stuck in the middle, and the bines tied to these with twine. The earth is then forked and thrown round their roots: each of these triangles is technically called "a hill," I suppose from the earth heaped round the roots. A thousand such hills usually go to the acre. The garden is at all times kept perfectly free from weeds, and if any plant of the three dies, or "misses" as it is termed, it is immediately replaced from a nursery kept for the purpose. The first year the bines grow about 4 feet, but unless a very good season there is no sign of the hop-cone.

In November the earth is forked up and heaped again round the hills, which are then left undisturbed till spring, when all the hillocks are opened, and the shoots and suckers of last year cut off close to the main stem. I have heard, though I have never seen it done myself, that in some parts these are served up to table, dressed as asparagus, and are very good. According to Pliny the hop was a garden plant with the Romans, who kept it for the sake of eating the young shoots. The 4-feet poles are now changed for 12-feet ones, this being judged as the amount of growth for the second year. At first sight you may wonder why one long pole should not do once and for all, and think the growers not unlike Sir Isaac Newton, who made a big hole in the door for his cat to escape, and a little one for her kitten: but there is no analogy, for were the pole longer, the hop would always be striving to reach the top, and would thus grow weedy, and drawn beyond its strength.

A good season and careful culture may produce about 4 cwt. per acre the second year.

The same process of digging and manuring goes on the second autumn, people always being at work carrying the stones and weeds off the land, tying up the bines and replacing plants that have "missed." The third spring poles from 18 to 20 feet take the place of the 12 feet poles.

And here it may be as well to say a word about poles, for they are a very

important and expensive article ; whole plantations of chesnut are planted for the express purpose of supplying hop poles, for owing to their having to stand in the earth so long, and being exposed to all weathers for many years, they have to be of stout wood in the first instance. Great quantities of larch are imported from Belgium, but these are not so durable, and sell at a lower rate than chesnut. In order to prevent the ends that are imbedded in the ground for 8 months out of the twelve from rotting, they are dipped in a large iron machine containing a boiling solution of corrosive sublimate or creosote. This is a very strong preservative, often after the poles have done their work, and are being chopped up for firewood it is found that the part that has been buried in the damp earth is, owing to the composition, quite sound, while the remainder of the pole is almost completely rotten.

The cost of dipping is about ½d. a pole, it has been recommended to dip the whole pole, but this of course would greatly add to expense, while it is not certain that the tarry substance would agree with the bine.

In the third year the plant reaches perfection ; now supposing the soil and position to be good, and a sufficient amount of rain to have fallen, you may imagine the grower is booked for a good year : this, unfortunately, by no means follows as a necessity. There is the blue mould and the blight to fear, and, worst of all, the farmer's great bane the hop flea and the hop fly.

The hop *flea* is a tiny insect about one-tenth of an inch in length which settles on the tender shoots in spring, and eats them up.

The hop fly (*aphis humuli*) is a trifle larger, it appears about the beginning of June on the under sides of the leaves and stems, and is the farmer's great dread.

On their first appearance in a carefully kept ground, a machine with a brace of fans which scatter powdered brimstone as it goes is sent along the alleys : this very useful machine is a late discovery, of course the process is expensive for it takes a good deal of brimstone to scatter some on every leaf, care too must be taken not to sprinkle the leaves too thickly or the taste will be detected in the hops which will thus be rendered good for nothing.

The crop varies from Nil to 20 cwt. per acre ; in some of the famous gardens in East Kent the crop this year is 17 cwt., which is considered very good. The cost for cultivation is about £28 per acre. Mr. Harvey, a grower of long experience in East Kent, has been kind enough to send me a list of the average rate of annual expenses for an acre of hops in full pole. It is not worth while to read you it in full, but some of the principal items you may like to hear.

Manure per acre, £5.

New poles annually, £7.

Harrowing the ground, £2.

Picking at 7 cwt. per acre, £6 3s.

Cost of hop pockets, £1 12s.

The other items are for cutting, tying, rounding, poling, packing, drying, &c. If you take 7 cwt. per acre as an average crop, the price per cwt. is about £5 to £7. Hops vary so much in quantity and quality that no average profit can be stated; last year Mr. Harvey says 30 acres of hops only produced a return of £600, thus he lost £200 by cultivation, this year they will fetch £1,400 at the least.

Last year these plagues were very great, while owing to the drought, farmers who had a river or water handy were glad to water each individual root by hand; of course this was very expensive.

After all, very few gardens paid their way, and it was altogether a bad year; supposing though the dangers of drought, blight, mould, and the unwelcome visits of the aforementioned aphides to have been safely tided, the flowers will shew in thick clusters at the end of July or the beginning of August, these flowers which are called 'burr' are taken as an augury of the produce; this burr soon changes into the hop-cone, and all is ready for the harvest in the middle of September, then you may see every Kent road crowded with tramps, many Cockneys, Irish among them who have come over for the picking, for it is light and pleasant work and good pay.

Every hop-growing village is deserted, and the houses are left desolate in the day time, old men and young men, old women and young women, and children of all sizes live in the hop gardens in a fine hop-picking season. Even the confirmed invalids seem to revive miraculously at the time and crawl to pick a few hops the aroma of which is said to be peculiarly health-restoring. At night the scene is totally different. The streets are crowded with noisy strangers, the tap-rooms of the public houses are crowded with the bacchanals of both sexes, shouting songs at the top of their voices. Hopping in fact is the Kentish carnival, at which good humour for the most part prevails, for beyond a certain average of daily fights, the strangers behave fairly well. In last week's *Saturday*, or the one before, there was I think a description of the exodus of cockneys from London, also a description of Bavarian picking, which seems to be very different from our own Picking in England lasts about a month.

The *modus operandi* is something as follows: women with all their available children, old men past hard work, and such a sprinkling of men as are not elsewhere wanted, sit in groups in the alleys, each party with sundry small baskets and one large basket to hold five bushels exactly; men then cut down the bine from the pole, about three feet from the ground, and place it in large heaps before the pickers, who then set to work picking as hard as they can; as soon as a group can fill the basket brim-full, they summon the fore-

man, who is armed with a quantity of "tallies." Each tally consists of two pieces of wood, fitting accurately together, one of which the group of pickers keep, the other being retained by the foreman; when he hears "tally" called he fits the tally of the group who have filled the big basket to his own, and makes a nick with his knife on both. The basket is emptied: this mode of securing the honesty of the picker is a very old one, I believe. The average sum paid for filling the large basket (I forget how many bushels it holds exactly) varies according to the plentifulness or scarcity of hops, less being paid in a good year when the hops lie closer together and so are easier to pick.

More science is required in filling a basket than would be imagined by a stranger; a practice called "hovering" is in vogue. This operation consists in gently putting both your hands deep into the basket, and allowing the hops to glide very gingerly over your fingers, so that the hops lie as lightly as possible on each other, and the basket is much sooner full, which, of course, is the chief object of the pickers. Before we leave the garden I must not forget the ancient Kentish customs of the hop garden, which in some parts are still kept up. If you, being a perfect stranger and looking like a gentleman, go unaccompanied into a garden, you will be astonished to find a pretty girl come up and present you with a particularly fine bunch of hops, which you will be expected to requite with a silver fee, generally half-a-crown. At the beginning of the season they pick out the prettiest girl in the garden, and assign to her the duty of taking toll of strangers; the money received is afterwards divided among the whole of the pickers, a larger portion being given to the good-looking tax-gatherer. This, however, is only, by the way, to return to the more serious business of hops.

The hops are taken off in loads as soon as picked to the nearest hop-kiln, or hop-oast, as it is called; one of which every farm of any size possesses where hops are cultivated.

For the benefit of those who have never seen an oast, I will try to explain what one is like. There is a round, red, brick building, 20 feet in diameter perhaps, which is built straight up like a tower for 20 feet or so, when it begins to narrow towards the top; at the top there is a chimney called a cowl, which revolves to suit every change of wind, inside about half-way up a hair cloth stretches across, on this the hops are placed, and are gradually dried by smokeless furnaces that have been lit some time before. The drying takes 11 or 12 hours. The heat has to be very carefully regulated or the hops will lose their colour and fragrance; this would materially damage their value in the market. It is quite a separate and a somewhat rare accomplishment to be a good hop-dryer: two hours is the maximum of sleep he gets in the 24 hours while drying is going on. When the leaves of

the hops become brittle and rub off, they are sufficiently dry; they are then laid in heaps on the floor, and after a little more heat are ready to be packed. This is done through a round hole in the floor of the loft, a long canvas bag being placed beneath. Particular care is taken to pack these bags very tight, a handful of hops is placed in the bottom corners, and tied up tight, then it is gradually filled, a man stamping them in as tight as he can the while. Some may have seen long stout canvas bags stamped with the Kentish horse, and motto "Invicta," lying outside Westall's shop in the High-Street. These bags being six feet long, three broad, and stuffed so tight it is impossible to make the slightest impression on them, are facetiously termed "pockets," and as such are sold.

Each pocket contains 1 cwt., 2 qrs., 8 lbs., as near as the dryer can calculate. They are all marked with the name of the grower, the parish where grown, and the year they are produced in. The East Kent hops have the Black Horse on them, and none but these dare to have the mark under a heavy penalty. Brewers are well acquainted with the quality each parish grows, and the price varies even in East Kent, as some gardens are much better than others. Inferior hops, such as are grown in Sussex and the Weald of Kent, are only fit for beer that is quickly consumed, while East Kent hops will keep beer for years.

This year is a very good year for the farmers; I have been told by a farmer that one acre of good hops is worth 5 of the best wheat ever grown, so remunerative are hops. On the other hand it is of no use attempting their cultivation on any but the best soil, even the crop occasionally totally fails, in some years not a single hop is picked and the loss is then tremendous. Hop-growing then is of a somewhat speculatory nature, but with a large capital always pays in the end.

Many are the walking and riding tours taken through the hop district of Kent during the picking, for the spectacle is a very pretty one not at all unlike a foreign vineyard, and comes at a seasonable time of year.

One word about the pickers. Many of them come from a distance, the farmer then is compelled to lodge them. At present they get no better accommodation than long sheds built for the purpose, better or worse than a cowshed as the case may be, in these they are herded like so many cattle, quite irrespective of age or sex, with merely a truss or two of straw to lie down on, and the use of the nearest farm-yard pond. Housed like this, they must loose all self-respect, and it is a certain thing that the crime calendar of the Autumn Sessions is by no means a small one. There was a picture in the *Graphic* this time last year of these sheds, which I daresay a good many can remember to have seen. Until the law or the opinion of society compels better lodging to be found, the present state of things will remain an annual disgrace to England.

Everyone I think must know that the hop as used in brewing gives the beer its bitter flavour, and what is termed "Bitter" is simply "doubly hopped beer." To enter into a disquisition as to the exact way the brewers use the hops would take too long and would involve a treatise on brewing, about which I know nothing. Therefore hoping Kent will long keep up her reputation for Hops, thus I must conclude my maiden paper.

E. Meyrick then exhibited a curious thistle of very large dimensions.

There were 20 persons present, 2 Hon. Members, 14 Members, and 4 Visitors.

MEETING HELD OCTOBER 11TH, 1872.

C. E. Vaughan read a paper on Balloons.

E. Meyrick then passed round the remainder of his Entomological Notices.

There were 22 persons present, 2 Hon. Members, 14 Members, and 6 Visitors.

MEETING HELD NOVEMBER 1ST, 1872.

The President gave an account of his Visit to Brazil, exhibiting numerous specimens in the course of the lecture in illustration of his subject.

There were 75 persons present, 8 Hon. Members, 24 Members, 1 Associate, and 40 Visitors. Mrs. Farrar and Mrs. Fergus were also present.

MEETING HELD NOVEMBER 8TH, 1872.

G. F. Rodwell, F.C.S., F.R.A.S., read the following paper on "Space of Four Dimensions," followed by one on "The Electric Telegraph," illustrated by experiments and exhibitions.

ON SPACE OF FOUR DIMENSIONS.

OUR bodies occupy space of three dimensions; we live in space of three dimensions: this room has length, and breadth, and height. Space is the measure of the extension of the Universe. We determine the form and posi-

tion of any material object by assuming three infinite planes, fixed in infinite space, and at right angles to each other. Space then is the room occupied by matter, or included between distant masses of matter, and as such we know of it only as having three dimensions :—its length, its breadth, its thickness. The celebrated German mathematician Gauss, used to say that one of the happinesses of a future existence would be the amplification of the conceptions of space; the realization of that which we had once known as space of three dimensions, as space of four dimensions. For just as we can conceive of beings "like infinitely attenuated book worms in an infinitely thin sheet of paper," which can only realise space of *two* dimensions, so also we may conceive of beings capable of realising space of *four* dimensions.

Now I want to bring before your notice this evening a few ideas which have recently occurred to me, and which I think may help us to realise,—dimly indeed and faintly,—the idea of the possibility of the existence of space other than that which now surrounds us. This I propose to do by two separate methods :—firstly, by transferring our conception of space to space of less dimensions, that is by a process of diminution; secondly, by the idea of a motion of known space, that is a process of augmentation.

Our knowledge of the material universe involves the conception of *space*, *number*, and *time*. These are intuitive notions: we cannot strictly define them in the abstract; our notion of them is merely relative, that is, apart from material existence we cannot realise them. Extension is a necessary property of matter, and our conception of space is linked with our conception of extension.

Robert Hooke, the mathematician, in a series of lectures *De Potentia Restitutiva*, written nearly two hundred years ago, and too little known, defines a sensible body, as "a determinate space, or extension defended from being penetrated by another by a power from within." This power may most fittingly be conceived to be a vibratory motion, like that of a pendulum; an oscillation across a position of rest. Imagine a plane to be rapidly oscillating between two fixed planes, then a solid bounded by those two fixed planes would be the result. Take for example an infinitely thin sheet of iron one foot square, and let it vibrate with extreme velocity in a space of one foot, and a cubic foot of iron will be the result, provided the plate oscillate so quickly that nothing can penetrate into the space in which the oscillations take place. An impenetrable space results; in fact what we call matter, for matter is by definition impenetrable.

An infinitely thin line vibrating between two points would furnish a plane, an infinitely thin plane vibrating between two fixed points would furnish a solid figure. We thus see how by the addition of motion we may convert a determinate space approximately of one dimension, into space of two dimensions;

and how by the addition of motion we may convert space of two dimensions into space of three dimensions. Can we conceive of any motion which given to space of three dimensions shall generate space of four dimensions? We do not know of such motion, but we can conceive the possibility of its existence. Space of four dimensions is transcendental space; it is beyond the limit of our experience, but not I imagine beyond the limit of our imagination.

Let us endeavour to realise the condition of a sentient being living in space of *two* dimensions. That which distinguishes man from brutes is his erect bearing, his eyes are directed heavenwards, theirs are directed earthwards, says some old writer whose name I have forgotten. You know our eyes take in a great range of space; if we bend our head back we increase that space; if we bend our head forward we limit that space. Again our eyes move in every direction, our head moves in every direction, we can enlarge or diminish our sphere of observation at pleasure. Now suppose that a man thus endowed, begins to stoop forward, his eyes take in less of space; he stoops yet more forward, his body forms an angle of 80, then 70, 60, 50 degrees in succession with a horizontal plane, then he is obliged to go on all fours, his limbs shorten, and are gradually absorbed into the mass of his body, he crawls, he creeps, at last his limbs disappear altogether, and he trails himself along. All this time his range of vision has become more and more limited, his head less and less capable of motion, his eyes consequently see the earth only, he can see no sky, he cannot see to the right or the left. Now his body begins to diminish in thickness, he becomes thinner and thinner, and thinner, and when he has become as thin as you can imagine, let his thickness be expressed as the numerator of a fraction, of which the denominator is an infinitely great number; say as many figures as will reach ten million miles, written close beside each other on paper, say ten in an inch. Now he is a mere plane, an infinitely thin surface, he occupies space approximately of *two* dimensions. Now try to imagine what the ideas of space of such a being would be, compared with our ideas of space, compared with his own ideas before he was flattened. He would contemplate now only a plane surface, he would see length and breadth, he would never see thickness. Again, compare his ideas of space at each and any position between verticality and horizontality, and think how much they must differ. Again to come nearer home, and back into the world of real existence, compare your own ideas of space after concentrating your vision for an hour on a book a foot square, with the ideas of space you acquire in ascending a lofty mountain, or when you lay on your back on the deck of a vessel in mid ocean. Compare the views of space possessed by a man who has been imprisoned in a dungeon 8 feet square for 40 years, of La Sachette in the *Trou aux rats*, of a being bedridden for half a century, with that of a hunter in the prairies, a sailor, even an ordinary dweller in a non-mountain-

ous country. I say the conceptions of space of these people will vary enormously; remove the possibility of contemplating great space, and the faculty of doing it will gradually die out, and so we may arrive at our being living in space approximately of two dimensions. If the contrast is great, as we know it to be in the above examples, how infinitely greater must it be in the case of one who contemplates space of two dimensions, compared with one who contemplates space of three dimensions. Again, imagine the conception of space possessed by a mole, a flat insect, or a serpent, and compare it with that of an eagle or condor.

The capability of the senses is curiously modified by habit: do you remember when Gulliver returned from Brobdignag he thought men of his own size the most insignificant little creatures? ....."When I first got into the ship, and the sailors stood all about me, I thought they were the most little, contemptible creatures, I had ever beheld."....."I saw the dishes of the size of a silver threepence, a leg of pork hardly a mouthful, a cup not so big as a nutshell."....."My daughter kneeled to ask me a blessing, but I could not see her till she arose, having been so long used to stand with my head and eyes erect to above sixty feet, and then I went to take her up with one hand by the waist. I looked down upon the servants, and one or two friends who were in the house, as if they had been pigmies, and I a giant." Gulliver had so long been in the habit of contemplating great space, that now that his range was limited everything seemed diminutive, so if we live in a house with several people of short stature a tall man seems gigantic.

And now let us think of our being of two dimensions—length and breadth, becoming narrower and narrower, and when he has become as narrow as you can well imagine, divide his breadth by an infinitely great number, and you arrive at an approximation to one dimension. He has now only length; his one eye is motionless, and is a point, and he sees only space.

I say then by conceptions such as these we may arrive at a crude contemplation of space other than that in which we now exist.

Again let us try to imagine an extension of our three dimension space instead of a diminution: and this I propose to do by superadding motion to our known space. One and the same body may possess many kinds of motion at the same time. If I walk across the room, talking the while, my vocal chords possess, (*a*) proper vibratory motion of their own in a vertical plane; (*b*) *plus* the rectilinear motion of translation caused by my movement in walking; (*c*) *plus* the rotatory motion of the earth about its axis; (*d*) plus the motion of revolution of the earth about the sun; (*e*) *plus* the motion of translation of the whole solar system through space. The vocal chords thus possess five distinct motions at the same instant of time, and many of these motions are executed with an extreme rapidity. Suppose now that our bodies instead of

being at apparent rest were to bodily vibrate in an arc of 50 feet, as if we formed the bobs of gigantic pendulums higher than S. Peter's, we should occupy a far greater space than now; we, filling this room, should then require Upper School to contain us. But let us individually vibrate in an arc of a thousand miles with infinite velocity, so as to cause the range of our vibration to become a space incapable of penetration by external matter, and let the plane of the direction of our vibration itself oscillate between limits ten thousand miles apart, and let it also be impenetrable, and let the whole oscillating system move with infinite velocity in a circle a million miles diameter, and let the circle rotate upon its diameter, and let the sphere of revolution thus formed revolve in an infinitely great ellipse, and let the ellipse rotate about one of its axes, and I think we get a somewhat enlarged idea of our own space. Conceptions of this nature sufficiently pursued may lead us to the threshold of transcendental space.

There were 115 persons present: 5 Hon. Members, 23 Members, 2 Associates, and 85 Visitors.

MEETING HELD NOVEMBER 22ND, 1872.

The President announced that C. L. White had been elected a member of the Society: that the Committee had decided upon allowing each member to introduce three visitors to the meetings: that R. W. Doyne had been elected Curator in the place of M. A. Chilton, who had failed to perform his duties: and that E. F. im. Thurn, Esq., had made a most liberal offer to the Society, not only of endeavouring to resuscitate the ornithological section and of arranging the present collection of birds, but also of presenting his own collection of birds for the benefit of the Society. The next meeting would be devoted to an explanation of his objects and views.

As there was no paper, the meeting was devoted to the exhibition of various donations, &c., which were as follows:—

By H. C. Spry, Esq:—a series of models of Indian fruits, among them those of the peach, melon, fig, plantain, mangoe, cucumber, water nut, custard apple, guava, &c. A metal mug, a wooden box, and fan of Indian workmanship. Two large elaborately printed cotton cloths. A series of old Indian coins. Shoes, caps, bangles, nose rings, and ornaments for the ears and forehead, worn by the natives of India.

By Captain R. B. Reed:—Two large boxes of Indian Butterflies and Moths, named, the first instalment of a collection which he proposes to form for the Society.

By C. W. Houghton, Esq.:—Teeth of Fossil fish from the Grand Canary found at a height of more than 500 feet above the level of the sea. Teeth of Guanches (the original inhabitants of the country); volcanic stone and pyrites from the Grand Canary: also four samples of cochineal and some cochineal skins.

By G. F. Rodwell, Esq., F.C.S:—Portion of the original Atlantic cable.

By C. W. Everard, Esq.,—a second series of Chinese plants.

By H. A. Evans, Esq.,—a specimen of the Hobby, caught in the College grounds.

By Mr. Perkins:—a specimen of the Kingfisher, and an old coin.

By W. O'N. Lindesay:—Skin of a species of mouse (*mus dimidiatus*) from Aden.

By Rev. A. E. Dayman:—Hornets' nest found in the wall of a cottage at Shillingstone, Dorset.

By W. Fergus, Esq., M.D.—Portion of a wasp's nest.

After which, the President exhibited a large collection of Snakes, three kinds of wasps' nests, and some dried plants from Brazil: and gave a short account of a Fazenda or Coffee Farm.

There were 42 persons present, 4 Honorary Members, 14 Members, and 24 Visitors.

MEETING HELD DECEMBER 13TH, 1872.

The President announced that F. W. Toms had resigned, and that M. A. Chilton had been deprived of membership.

He also announced that Akerman's "Numismatic Illustrations of the New Testament" had been presented to the Society, probably by F. Madan, Esq.; Smee's "My Garden," by Rev. C. Soames; Proceedings of the Linnean Society, by F. E. Hulme, Esq, F.L.S., &c.; and a large collection of dried Plants by E. Meyrick.

E. F. IM THURN then gave the following address on

AN IDEAL SCHOOL NATURAL HISTORY SOCIETY.

As an old Marlburian, as a member of this society, and as one who has done some work in it, I ask you to hear a few words of mine concerning your museum and your work:

I choose this moment for speaking, for I have lately been much struck by a fact which I myself have observed and which I have heard spoken of. Natural science is now so rapidly taking its place amongst older branches of education, such as classics and mathematics that, year by year, the scholarships and other prizes offered for this at the various universities and similar institutions become more numerous. Pupils of almost all our large schools gain these, but there is one notable exception and that is, I am sorry to say, our own school.

Why is this? I have been answered that our Society never intended to teach science—that it merely means to elicit in its members powers of observation, to teach them, that is, to use their eyes. If this plea of want of will is urged, I can only say that I think a natural history society may fairly strive to offer every opportunity of learning to such of its members as may wish to study science. Of course in a society constituted as our is, little more can be done than keeping in efficient working order various reference collections.

Again, if the plea of want of power is urged, and I am answered that the most instructive science lectures, the most perfectly organised natural history societies may utterly fail to procure any attention,—may fail to produce a single scholar; will so fail unless there is by chance amongst those to whom these instructions are afforded one whose talents especially fit him for such studies. Good; but surely it is a most strange chance that among the hundreds who for a time live within these walls, and then make way for others, there should never be any thus gifted; that though they are to be found in most other schools such should avoid Marlborough.

A truer reason is, I think, that though there are among us a fair proportion who might do well in natural science, it is left to chance to point out such. Marlborough instructs all in classics, and thus affords the few whose talents fit them for classical studies, opportunities of finding out their powers. As long as it affords no regular scientific teaching, and in fact leaves it to chance—if any at all is given—many and many a boy, unfitted to excel in classics, must, for want of an opportunity of discovering his power of scientific study, find his life wasted, and must take his place among that large class of men whose lives have no one moving interest. Teach classics to all—teach science to all; each boy will instinctively choose and cling to the subject for which he is best fitted. This is, however, a matter in which we have no power.

I know that even during my time here various courses of lectures were given in the school, which being conducted in a graver spirit and treated more or less as part of the school work produced better results; further I am of

course aware that since my time greatly increased means of instruction in one branch of natural science have been provided by the school authorities.

I sincerely hope that the day may not be far distant when other branches may be equally recognised and represented; but in the mean time let us do our best both with the means now at our disposal and those which we can gain for ourselves,—let us work heart and soul and with all the earnestness which may lie in us, for it is not a subject with which we may trifle.

"We joined this society for amusement," you say? Good, and is it not amusement I am offering you? rational amusement; amusement with reason, with earnestness in it; amusement such as is requisite to make a good oar or a good bat.

Is there among you one who wishes to excel in school work? He strives with all his might; is there among you one who wishes to excel in cricket or in the rifle corps? He works with all his might; yet most of you join this society without any intention of doing real work. You are content to listen to an interesting paper now and then; to be amused by some exhibition. The natural consequence of this is that before long you find the whole thing a bore; you become too dead to the interests of the society even to care to take your name off its books.

Take my advice; if you think you will find interest in Natural History, use the advantages this society offers you; use them with all your might. But, if you do not mean so to use them, don't join the society.

But even to the working members there is a great danger. They too often turn their attention to too many subjects; fly from one subject to the other as each seems uppermost. Let them also believe me they are working themselves great harm and are wasting their opportunities.

So far I have spoken of your work, but I have also a few words to say of your museum. Your collections are now sufficiently large to be of some use to you if you cared to study them. In some instances they are not so well arranged as to leave you no excuse for not using them. If these collections were arranged with great care and as well as possible, so that even a chance glance should give some knowledge, a great step would have been taken in the right direction. I cannot do much for you, but what little I can do shall be done. I will, if you will let me, arrange your ornithological collection for you. This is the natural one for me to work upon; at the very first meeting which I ever attended the first skin was presented to this society, while I believe that I may claim the honour of being the donor of the second. During my time here the collection grew, thanks to the liberality of several people, of whom I may mention Mr. Gilmore, into one of the most considerable in this room; likewise into the worst kept of all, a fate which seems to attend this collection in every museum which I have seen. If

we therefore can succeed in working it up into a state of comparative perfection we shall have effected some good. This must however be a long and troublesome work, so that, though I hope you may see some change before long, you must not look for a very speedy final result.

My plans, which have already been submitted to the committee, and, I believe, approved by them, are as follows :

The materials upon which I propose to work are, firstly, your collection ; secondly, my own, which is not inconsiderable, and which I have much pleasure in offering to the society ; and thirdly, additions obtained either in exchange for duplicate specimens or by the assistance which those interested in the work will, I believe, give.

The collection is to be divided into three parts, which we may call A, B, and C.

A will be a typical collection, and will embrace a group representing each family ; such group consisting of (1) male and female of the type selected.

(2).—Skeleton of same.

(3).—Young of same.

(4).—Preparations exhibiting the more striking differentiæ of the family.

(5).—Specimens and printed lists of food : in cases where the food has clearly had much effect on the structure of the bird specimens will be given, in other cases simply lists.

(6).—Young and nest.

Due consideration being given to the small amount of room at our disposal, this series will be so selected that it may go into the present two cabinets with the addition of the hitherto missing top of the one on the left of the door, which top the committee has already kindly undertaken to supply.

Collection B. will include examples of all Marlborough birds, and those specimens of very rare English birds which the society either now has or shall in future have. Each species will be in a separate case, which will be made according to a fixed standard of size, that they may for the present occupy the vacant spaces on these walls, and yet may so correspond that in a future Museum each order may form a single block.

Collection C. will, I hope, in time consist of a complete series of skins of all British birds, to be kept in properly constructed drawers for purposes of reference.

I may here state that this collection will be completed by foreign skins, great care being of course taken that they are of the British type. My reason for urging this is, that I wish we should be among the first to condemn practically the murder of all rare or beautiful birds. Read a few pages of Gilbert White's Natural History of Selbourne ; you will make the acquaintance of a man whose pleasure in Nature was almost as

unrivalled as his accuracy in the subjects to which he turned his attention, but entirely without that terrible collecting mania. On the other hand turn to almost any number you please of the 'Field' or 'Zoologist' and there read the reception and welcome given to our rarest and loveliest winged visitors. Let me read you a short extract from my notes on the lectures of a certain Oxford professor, which gives far more clearly than I can give this difference.

"Let us first take an instance of the feeling towards birds which is especially characteristic of the English temper at this day, in its freedom from superstition. You will will find in your rudimentary series Mr. Gould's plate of the Lesser Egret—the most beautiful, I suppose, of all birds that visit, or, at least, once visited our English shores. Perfectly delicate in form, snow-white in plumage, the feathers like frost-work of dead silver, exquisitely slender, separating in the wind like the streams of a fountain, the creature looks a living cloud rather than a bird. It may be seen often enough in South France and in Italy, The last (or last but one?) known in England came thirty years ago, and this was its reception, as related by the present happy possessor of its feathers and bones—"The little Egret in my possession is a most beautiful specimen: it was killed by a labourer with a stick in Ake Carr, near Beverly, about 1840, and was brought to me tied up in a pocket handkerchief, covered with black wet mud and blood, in which state it was sent to Mr. Reed, of Doncaster, and restored in a marvellous manner."

Now you will feel at once that, while the peasant was beating this bird into a piece of bloody flesh with his stick, he could not, in any true sense, see the bird, that he had no pleasure either in the sight of that or of anything near it.

You would feel that he would become capable of seeing it in exact proportion to his desire not to kill it, but to watch it in its life.

Well that is quite a general law, in the degree in which you delight in the life of any creature you can see it, not otherwise. And you would feel, would you not, that if you could enable the peasant rightly to see the bird, you had in great part educated him? You would certainly have gone, at least, the third of the way towards educating him. Then the next thing to be contrived would be that he should see a man rightly, as well as a bird, to understand and to love what was good in a man, so that, supposing his master was a good man, the sight of his master was a joy to him. You would say that he was therein better educated than if he wanted to put a gun through a hedge and shoot his master."

An entirely valuable little piece of eloquence that, so valuable that since it occurred in a lecture unconnected with Natural History and might therefore never meet your eye, I have thought right to quote it to you.

To return to the collection, I cannot at present tell you which of the numerous classifications will be adopted; I must obtain the advice of the best authorities on this point; but it will most probably be that adopted in the new edition of Yarrel's British Birds, since that is likely for many years to come to be the standard work on this subject. I must also add that I propose in time to complete the whole by adding a small series of preparations and diagrams illustrative of the wing and its use.

If all this can be accomplished we shall have a collection invaluable in obtaining an accurate knowledge of the structure of British birds, while the forest, the downs, and the river must teach you their life history; provided you choose to make use of it, with a knowledge of this you will with greater ease pass on to the study of general ornithology. For my share in the work, I will give you as much of my time and work as I can rightly spare. I will also give you my own collection, not perhaps in itself very valuable, but to me most valuable, representing as it does no inconsiderable amount of work, reminding me as it does of many a pleasant place and pleasant hour, of some few friends whom I may never see again; you cannot therefore reasonably expect me to give it up unless with the strong hope of seeing it work for good. The plan now proposed seems to me productive of most good, and must therefore be carried out fully, or the birds remain in their present cabinets, so that when my work is once begun I must have no alteration of my work, no interference until the whole is done and resigned into the hands of the Committee.

I do not mean to say that I shall not suffer any advice from any member, on the contrary I shall indeed be grateful for it, though I cannot bind myself to follow it, nor do I mean to say that the committee may not at any time revoke the given powers; but in that case the bargain must be considered at an end on both sides; I will take back my birds and you will take back the management of your collections, either in the form in which they happen to be at the moment or restored as far as convenient to their present form.

For the assistance of those who may be inclined to aid in the work, I purpose as soon as I can draw them up to issue a list of all desiderata, and a short sketch of the intended collections.

Finally, if I can by these means or others make one more earnest in his work, if I can assist such a one, the work begun to-night will not have been begun in vain.

May the day be not far distant when really great changes shall make this a model of what a School Natural History Society should be.

E. F. im Thurn then exhibited two crocodile's eggs.

The Rev. F. W. Farrar, F.R.S., also sent for exhibition some beautiful figures of butterflies, consisting of actual specimens transferred to paper by some process, not yet made public.

There were only 25 persons present: 4 honorary members, 13 members, and 8 visitors.

ENTOMOLOGY.

The unfavourable character of the season has in some degree prevented our list for this half from quite coming up to the expectations formed of it; it is, however, certainly the longest we have ever had. The chief deficiency is among the Noctuæ; sugar proved almost entirely useless, and many usually common species were entirely absent; whilst even L. Pallens and X. Polyodon were represented by single specimens. This is the least worked of all the divisions, and has certainly yet large additions to receive. The Micros will also, of course, be very greatly increased by further investigations, as this is their first year. Most dates are later than usual.

One most startling event of the season has been the supposed occurrence of Parnassius Apollo, the Apollo butterfly, in the neighbourhood. A specimen is said to have been seen by Coleman, and many other persons near Great Bedwyn, towards the end of May; and another (or perhaps the same) by a keeper in the Forest, about a fortnight later. It seems really probable, from the description given of the insect seen, that the witnesses were not mistaken; but, unfortunately, in the case of dubious British species, only specimens are admissible as proof. We can only hope that it will turn up again next year, but there is not much probability of its doing so.

Although V. Antiopa visited England so freely this autumn, no specimens were noticed within our district.

Workers are in great request. Subjoined is a list of those who assisted me; their initials will be found in their proper places:

J.W.D.	... ...	J. W. Dudding.
F.W.G.	... ...	F. W. Giles.
B.J.G.	... ...	B. J. Guillemard.
H.M.H.	... ...	H. M. Hamilton.
F.J.H.J.	... ...	F. J. H. Jenkinson.
F.H.L.	... ...	F. H. Lee.
F.P.L.	... ...	F. P. Lefroy.
J.B.L.	... ...	J. B. Leventhorpe.
H.S.P.	... ...	H. S. Philpot.
S.D.S.	... ...	S. D. Smith.
T.N.H.S.	... ...	T. N. H. Smith.

E. MEYRICK.

RHOPALOCERA.

Gonepteryx Rhamni	Brimstone	Aug. 31.
Arge Galathea	Marbled White	July 27.
Lasiommata Ægeria... ...	Speckled Wood	July 1.

L. Megaera (2)	Wall	Aug. 28.
Hipparchia Tithonus... ...	Large Heath	July 13.
H. Hyperanthus...	Ringlet	July 3.
Cynthia Cardui	Painted Lady	Aug. 1.
Vanessa Atalanta	Red Admiral	Aug. 5.
V. Io	Peacock	Aug. 16.
V. Polychloros	Large Tortoiseshell	July 24.
V. Urticæ	Small Tortoiseshell	July 2.
Argynnis Paphia	Silver-washed Fritillary	July 15.
A. Adippe	High-brown Fritillary	July 5.
A. Selene	Small Pearl-bordered Fritillary	July 3.
Thecla Quercus	Purple Hairstreak	July 7.
Polyommatus Corydon ...	Chalkhill Blue	July 29.
Pamphila Linea	Small Skipper	July 8.

SPHINGINA.

Smerinthus Tiliæ ...	...	larva on elm, College, Aug. 16.
S. Populi	...	larva, Sept. 11.
Acherontia Atropos ...	...	a pupa at Ramsbury, Sept. 30.
Sphinx Convolvuli ...	...	one at rest, Ramsbury, Sept. 5.
S. Ligustri	...	larvæ, common, Aug. 19.
Macroglossa Stellatarum ...	...	Sept. 10, F.H.L., J.B.L.
Trochilium Tipuliforme ...	...	common at Marlborough in July, *Coleman.*

BOMBYCINA.

Hepialus Sylvinus	...	July 19.
Cossus Ligniperda	...	one at rest, July 9.
Cerura Vinula	...	larvæ common near Marlborough, *Coleman.*
Lophopteryx Camelina ...	...	one larva, Oct. 13.
Diloba Caeruleocephala ...	...	at gas lamps, Oct. 2—21.
Petasia Cassinea	...	bred, F.J.H.J.
Pygaera Bucephala ...	...	larvæ, Sept. 12.
Psilura Monacha	...	Forest, &c., July 25—31; larvæ July 8.
Dasychira Pudibunda ...	...	larva, Sept. 28.
Orgyia Antiqua	...	Aug. 29, Sep. 18; larvæ, July 29.
Stilpnotia Salicis	...	July 25.
Porthesia Aurifua	...	July 6—29.
Miltochrista Miniata ...	...	Loves Wood, July 16.
Lithosia Stramineola ...	...	common along the river; July 26, Aug. 1.
L. Complanula	...	July 25, Aug. 6.

L. Griseola ... ... common along the river; July 26—31.
Œnistis Quadra ... ... one bred, July 9.
Nudaria Mundana ... ... July 15.
Arctia Caja ... ... July 4—23.
Lasiocampa Rubi ... ... larva on heath, West Woods; Sept. 10.
L. Quercus ... ... July 21—30.
Pœcilocampa Populi ... ... one seen at gas lamp, *J. W. Baverstock*,
CLISIOCAMPA NEUSTRIA ... Chiseldon, Aug. 1.
Cilix Spinula (2) ... ... at light, Aug. 23; H.M.H.
Drepana Falcataria ... ... Henswood, July 2.

NOCTUINA.

Cymatophora Duplaris ... ... abundant at dusk; June 25, July 16.
Acronycta Psi... ... ... larvæ, July 29, Aug. 30.
A. Aceris... ... ... larvæ in College Field, Sep. 11, J.W.D.; Sept. 23.
A. Megacephala ... ... larva, Aug. 25.
A. Ligustri ... ... at sugar, Ramsbury, July 4—12.
A. Rumicis ... ... on a tree trunk, July 30.
Leucania Lithargyria ... ... common at light; July 8—23.
L. Pallens ... ... July 1.
Xylophasia Polyodon ... ... July 26.
X. Hepatica ... ... July 5—13.
Heliophobus Popularis ... ... Aug. 29, B.J.G.; Sep. 20.
Luperina Testacea... ... ... Aug. 19, Sep. 13.
L. Cespitis ... ... one at light; Aug. 29.
APAMEA GEMINA ... ... one at sugar; Ramsbury, July 10.
A. Oculea ... ... July 15—23.
Miana Strigilis ... ... June 30, July 21.
M. FURUNCULA... ... ... Ramsbury, Aug. 1.
M. ARCUOSA ... ... Ramsbury, Savernake Forest; July 27—30.
CARADRINA MORPHEUS ... at light, July 12.
C. Alsines ... ... July 4—9.
C. Blanda ... ... July 10.
C. Cubicularis... ... ... July 28, Aug. 1.
Rusina Tenebrosa ... ... at light, July 4.
Agrotis Suffusa ... ... at light; Aug 28, F.W.G.
A. Segetum ... ... July 1—8.
A. Exclamationis ... ... June 28, July 10.
A. CORTICEA ... ... at light; Ramsbury, July 4—8.
A. PORPHYREA ... ... July 3.

TRIPHÆNA INTERJECTA ...	Ramsbury, Aug. 1.
T. Orbona	at light; Aug. 28.
T. Pronuba	July 2—30.
Noctua Augur...	at sugar; July 5—9.
N. Festiva	June 25, July 3.
N. Bella	Aug. 30, T.N.H.S.; Sep. 16.
N. Xanthographa	Aug. 17—23.
Anchocelis Pistacina	Sep. 13, F.P.L.—29.
A. Lunosa	Sep. 28, H.M.H.—Oct. 15.
Scopelosoma Satellitia	beaten from thatch; Axford, Oct. 31.
Cosmia Trapezina	bred, July 25.
EREMOBIA OCHROLEUCA ...	at rest on a thistle-head; Henswood, Aug. 3.
Dianthœcia Capsincola...	one bred on June 27, F.J.H.J.
Miselia Oxyacanthæ	at light; Marlborough, Oct. 30.
Agriopis Aprilina	Sep. 30, *Coleman*
APLECTA ADVENA	at sugar; Ramsbury, June 26.
Hadena Dentina	July 4—11.
H. THALASSINA...	June 25—30.
Plusia Chrysitis	July 4—21; (2) Sep. 22.
P. Gamma (2)...	July 26, Sep. 30.
Amphipyra Pyramidea	July 29.
A. Tragopogonis	Aug, 19, F.P.L.—23.
Mania Maura	July 21—27.
Catocala Nupta	at light; Marlborough, Sep. 1—9.
GEOMETRINA.	
Ourapteryx Sambucaria	July 8—17.
Epione Apiciaria	July 31, Sept. 16.
Rumia Cratægata (2)	Aug. 26, Sept. 3.
Angerona Prunaria...	Henswood, July 2.
Metrocampa Margaritata	July 2—13.
Selenia Illunaria (2)	July 26, Aug. 1.
S. ILLUSTRARIA	Ramsbury Plantation, July 26.
Crocallis Elinguaria	July 21—30.
Ennomos Tiliaria	Aug. 23, H.S.P., Sept. 3.
E. Fuscantaria	Aug. 22—30.
E. Angularia	July 30.
Phigalia Pilosaria	larvæ, Sept. 7.
CLEORA GLABRARIA	Savernake Forest, July 30.
C. Lichenaria	bred and taken, July 1—17.
Bearmia Repandata	July 3—12.

B. Rhomboidaria	July 21—30.
Pseudoterpna Cytisaria	Aldbourne Gorse, July 16.
Hemithea Thymiaria	July 1—15.
Ephyra Porata (2)	Aug. 21—25.
E. Trilinearia	larva, Sep. 18.
Acidalia Scutulata...	July 10—27.
A. Bisetata	July 7—26.
A. Virgularia	Ramsbury, July 2—8.
A. Imitaria	July 10—21.
Bradyepetes Amataria	July 15—23.
AVENTIA FLEXULA	near Knighton, July 9.
Halia Wavaria	July 8—16.
Fidonia Atomaria	July 8—28.
Abraxas Grossulariata	July 8—29.
Cheimatobia Brumata	Oct. 13, Dec. 5.
Oporabia Dilutata	Nov. 4—28.
Emmelesia Alchemillata	Henswood, July 21.
Eupithecia Centaureata (2) ...	at light, Aug. 27.
E. SUBFULVATA	Ramsbury, &c., July 10—25.
E. Subnotata	July 6—19.
E. SUBCILIATA	Littlecote Park, July 20.
E. CORONATA	Loves Lane, Ramsbury, July 19.
E. Rectangulata	bred, July 4; taken July 9—11.
Thera Firmaria	near Chilton, on a fir-trunk, July 30.
Ypsipetes Elutata	July 13—26
Melanthia Rubiginata	Boltsridge Copse, July 2.
M.Albicillata	Henswood, July 2—8.
Melanippe Unangulata	July 13.
M. Biriviata (2)	July 27, Aug. 16.
M. Fluctuata (2)	July 26, Sept. 3.
Coremia Ferrugaria (2)	July 26—31.
C. Unidentaria (2)	Aug. 16—27.
PHIBALAPTERYX LIGNATA...	at light, Marlborough, Aug. 25—29.
Scotosia Dubitata	Aug. 26, B.J.G.
S. Vetulata	Loves Lane, Ramsbury, July 1—24.
S. Rhamnata	near Knighton, July 16.
Cidaria Miata	Sept. 30, Oct. 14.
C. Picata	July 1—13.
C. Immanata	Aug. 1, Sept. 22.
C. Prunata	July 10—21.
C. TESTATA	at light, Marlborough, Aug. 1.

C. Fulvata	June 26, July 11.
C. Pyraliata	July 8—15.
C. Dotata	Ramsbury, July 4.
Eubolia Mensuraria	July 13—29.
E. Plumbaria	July 8.
Anaitis Plagiaria	Sept. 2—7.
PYRALIDINA.	
Hypena Rostralis	Dec. 15, F.J.H.J.
Rivula Sericealis	near Knighton, &c., July 16—21.
Herminia Tarsipennalis	June 28—July 15.
Pyralis Farinalis	Aug. 28.
Aglossa Pinguinalis	June 26—July 21.
Pyrausta Purpuralis	July 18.
Paraponyx Stratiotata	at light, Marlborough, Aug. 24—26.
Hydrocampa Nymphæata... ...	Sept. 5—13.
H. Stagnata	July 16—22.
Botys Verticalis	July 6—Sept. 7.
Ebutea Sambucalis	June 26—July 15.
Pionea Forficalis (2)	Aug. 16—Sept. 11.
SPILODES CINCTALIS... ...	fields round Ramsbury, July 1—23.
Scopula Lutealis	July 16—Sept. 23.
S. Prunalis	July 2—21.
S. FERRUGALIS	Henswood, Sept. 5.
Stenopteryx Hybridalis	July 8—27; (2) Sept. 1—7.
Nola Cucullatella	July 20—29.
CHOREUTES SCINTILLULANA	near Chilton, Aug. 1.
EUDOREA AMBIGUALIS ...	round Marlborough, &c. June 27—July 18.
E. Cratægella	Ramsbury, July 20.
E. Frequentella	July 7—23.
E. RESINEA	Boltsridge Copse, July 24.
E. Angustea	at light, Marlborough, Sept. 4, S.D.S.
Achroia Grisella	Ramsbury, July 21—23.
EPHESTIA ELUTELLA ...	Marlborough College, June 20, F.J.H.J.
HOMŒOSOMA NEBULELLA ...	at light, Ramsbury, July 25—27.
ACROBASIS TUMIDELLA ..	Henswood, July 30.
NEPHOPTERYX ROBORELLA	Littlecote Park and Boltsridge Copse, July 20—26.
CRAMBUS INQUINATELLUS...	Ramsbury Plain, July 28—Aug. 1.
C. Geniculeus	July 29—Aug. 1.
C. Tristellus	July 5—28.

C. Perlellus	near Ramsbury, July 10—17.
Chloephora Prasinana	larvæ, Sept. 14—29.
C. Quercana	one bred, July 4.

TORTRICINA.

Antithesia Betuletana	Chilton & West Woods, Aug. 1—Sept. 3.
A. Ochroleucana	near Ramsbury, July 9—12.
A. Marginana	June 11.
Tortrix Heparana	July 13—Aug. 16.
T. Ribeana	July 6—Aug. 21.
T. Corylana...	July 31, Aug. 17.
Lozotænia Sorbiana	one bred, July 6.
L. Fulvana	Henswood, &c., July 4—21.
L. Roborana	Loves Wood, July 25.
L. Xylosteana	July 13—27.
L. Rosana	July 1—30.
Ditula Angustiorana	June 26—July 15.
Notocelia Udmanniana	July 2—27.
Spilonota Roborana	June 26—July 19.
S. Trimaculana	Ramsbury, July 15.
Lithographia Nisella	West Woods, &c., July 30—Sept. 14.
L. Penkleriana	July 7—Sept. 8.
Pœdisca Solandriana	July 25—Sept. 11.
Catoptria Hohenwarthiana ...	June 26—July 17.
Halonota Bimaculana	West Woods, Sept. 10—15.
H. Tetragonana	Henswood, July 31.
H. Inopiana	Springs Hill, Ramsbury, July, 13—20.
Dicrorampha Petiverella	July 13—25.
Cocyx Hyrciniana	July 2—21.
Hedya Ocellana	July 7—28.
H. Dealbana	July 5—28.
H. Trimaculana	July 2—9.
Steganoptycha Nævana	July 27, Aug. 24.
Anchylopera Lundana (2) ...	July 25—30.
Bactra Lanceolana...	June 27.
Dictyopteryx Contaminana ...	Aug. 29, Sept. 18.
D. Loeflingiana	July 2—28.
Crossia Bergmanniana	June 29, July 19.
C. Forskaleana	July 20—31.
C. Holmiana	July 11—17.
Oxygrapha Literana	Sav. Forest, &c., Aug. 17, T.N.H.S. Sept. 21.

Peronea Schalleriana	Rabley Copse, Aug. 16.
P. Comparana	July 15, Sept. 7.
P. Tristana	Boltsridge Copse, Sept. 14; one bred from pupa found at Mildenhall, Oct. 5.
P. Favillaceana	Aug. 1, Nov. 14.
P. Variegana	July 26, Sept. 7.
Teras Caudana	Manton Copse, Aug. 19—21.
Pœcilochroma Profundana ...	July 30, Sept. 9.
P. Corticana	July 7, Sept. 13.
Anisotænia Ulmana	Little Frith, July 3.
Semasia Spiniana	Rabley Lane, Sept. 3.
S. Woeberana	Ramsbury, July 8.
S. Janthinana	near Ramsbury, July 31.
S. Nanana	July 25—30.
Eucelis Aurana	lane near Knighton, July 9—14.
Carpocapsa Splendana	Sav. Forest, &c., July 30, Aug. 1.
Grapholita Ulicetana	June 26, July 17.
Cnephasia Virgaureana	July 2—30.
C. Alternella	July 19—24.
Ablabia Pratana	Aldbourne Gorse, July 27.
Euchromia Striana...	June 28, July 7.
Argyrolepia Subbaumanniana ...	Aldbourne Gorse, July 25.
A. Badiana	Ramsbury Plantation, July 13.
Xanthosetia Zoegana	Love's Wood, July 21.

TINEINA.

Tinea Tapetzella	Ramsbury, July 25.
T. Arcella	July 2—8.
T. Cloacella...	July 4—13.
T. Semifulvella	Boltsridge Copse, &c., July 2—8.
Swammerdamia Caesiella	June 22, July 16.
S. Lutarea	Ramsbury, July 24.
Hyponomeuta Plumbellus... ...	July 25, Aug. 29.
H. Padellus...	Aug. 16, Sept. 3.
H. Evonymellus	July 30, Aug. 26.
Anesychia Decemguttella... ...	larvæ, Rabley Copse, Aug. 17, Oct. 2.
Prays Curtisellus	July 1—22.
Plutella Cruciferarum (2)... ...	Sept. 4—11.
Cerostema Sequella	Boltsridge Copse, July 10.
C. Vittella	Sept. 28, Oct. 3.
C. Radiatella	Aug. 1, Oct. 11.

C. Costella	July 8—29.
C. Sylvella	Aug. 16, Sept. 9.
C. Alpella	Savernake Forest, July 31.
C. Scabrella...	Savernake Forest, July 31.
C. Xylostella	July 21—29.
Phibalocera Quercana	July 18—27.
Depressaria Costosa	Aldbourne Gorse, July 15.
D. Umbellana	Sept. 9—12.
D. Arenella	Sept. 11, Oct. 9.
D. Propinquella	Sept. 11—29.
D. Subpropinquella	Sept. 14, Oct. 3.
D. Alstroemeriana	Sept. 18—25.
D. Purpurea	Sept. 10, Oct. 24.
D. Conterminella	one bred, July 2.
D. Ocellana	near Axford, Oct. 13—22.
D. Applana	July 27, Oct. 29.
D. Ciliella	Sept. 14, Oct. 1.
D. Pimpinellæ	Sep. 29, Oct. 5.
D. Albipunctella	Sep. 14, Oct. 1.
D. Chærophylli	Oct. 8—17.
D. Ultimella	Oct. 8—27.
D. Nervosa	Oct. 10—26.
D. Heracliana	Sep. 14—22.
Gelechia Cinerella...	near Marlborough; June 30, July 6.
G. Rufescens	Boltsridge Copse; July 25—28.
G. Populella	Sep. 14.
G. Sororculella	one bred from larva near Ramsbury; July 18.
G. Terrella	June 26, July 15.
G. Domestica	July 21—29.
G. Proximella (?)	larva in Savernake Forest; Sep. 28.
G. Notatella	June 12.
G. Vulgella	Aug. 24—26.
G. Fugitivella	July 13.
G. Maculea	Aug. 17, 29.
G. Tricolorella	July 30, Aug. 16.
G. Triparella	Loves Lane; Ramsbury, July 6.
G. Gemmella	Rabley, &c.; Aug. 17, Sep. 7.
Chelaria Hubnerella	July 30, Sep. 8.
Œcophora Flavimaculella... ...	Aug. 17, Sep. 7.
Œ. Tinotella	June 20, July 1.

Argyresthia Nitidella	July 7, Aug. 23.
A. Spiniella	Crofton, Sep. 7.
A. Albistria...	July 15, Sep. 18.
A. Semifusca	Aug. 17, Sep. 15.
A. Gœdartella	July 19—31.
Gracilaria Stigmatella	Oct. 8—21.
G. Elongella	Savernake Forest, July 31.
G. Tringipennella	Aug. 22.
G. Auroguttella (2)	July 29, Aug. 1.
Coriscium Sulphurellum	Savernake Forest; Aug. 1, Sep. 22.
Ornix Avellanella	larvæ; Oct. 5—21.
O. Anglicella	larvæ; Oct. 8—11.
O. Betulæ (?)	larvæ in Savernake Forest; Sep. 28, Oct. 7.
Coleophora Fuscedinella	July 16—27.
C. Gryphipennella...	June 23—28.
C. Annulatella	July 24—30.
C. sp. [?]	cases on birch, Savernake Forest; Sep. 29, Oct. 3.
Laverna Epilobiella	Sep. 7, Oct. 11.
L. Decorella	near Ramsbury; Oct. 12, 31.
Elachista Magnificella	Rabley Copse; Aug. 17.
E. Obscurella	June 1—6.
E. Megerlella	June 26—31.
E. Zonariella	Manton Copse; Aug. 23, Sep. 7.
E. Triatomea	near Knighton; July 9.
E. Pollinariella	Rabley Copse; June 20.
Tischeria Complanella	larvæ; Oct. 30, &c.
T. Marginea	larvæ, Nov. 1.
Lithocolletis Cramerella (2) ...	July 27.
L. Ulmifoliella	larvæ, Savernake Forest; Sep, 28, Oct. 13.
L. Spinolella (?)	larvæ, Sep. 29, Oct. 3.
L. Pomifoliella	larvæ, Oct. 9—15.
L. Spinicolella	larvæ, Sep. 28, Oct. 3.
L. Faginella	larvæ, Oct. 5—30.
L. Coryli	larvæ, Rabley Lane, &c.; Sep. 9—30.
L. Lantanella	larvæ, Oct. 13, Nov. 8.
L. Nicellii (?)	larvæ, Oct. 4.
L. Schreberella (?)...	larvæ, Oct. 8—31.
Phyllocnistis Saligna	in thatch; Aug. 28, Oct. 29.

Cemiostoma Laburnella	Ramsbury, &c.; July 21—30.
Nepticula Atricapitella	larvæ, Savernake Forest; Oct. 23—29.
N. Oxyacanthella (?)	larvæ, near Marlborough; Oct. 24.
N. Viscerella	larvæ, Oct. 23—30.
N. Anomalella	larvæ, Oct. 23.
N. Floslactella	larvæ, Oct. 23—Nov. 1.
N. Angulifasciella	larvæ, Nov. 1—16.
N. Microtheriella	larvæ, Oct. 23—Nov. 1.
N. Plagicolella	larvæ, Nov. 8—11.
N. Tityrella...	larvæ, Oct. 30—Nov. 9.
N. Marginicolella	larvæ, Oct. 23—28.
N. Aurella	larvæ Oct. 31—Dec. 2.

PTEROPHORINA.

PTEROPHORUS ACANTHODACTYLUS	Boltsridge Copse, &c. June 26—Sept. 1.
P. PHÆODACTYLUS	Chilton chalk-pit, July 16—21.
P. BIPUNCTIDACTYLUS ...	July 10—31.
P. Fuscus	July 1—26.
P. Pterodactylus	Sept. 5—Nov. 2.
P. Pentadactylus	July 1—17.
Alucita Polydactyla	Aug. 30—Oct. 29.

BOTANICAL NOTICES.

THE following notices were kept by Rev. J. Sowerby up to the end of October. The month of November was very wet and but few entries were taken. In December, however, more energy was displayed and consequently more notices were recorded. It does not follow, therefore, that because no entry occurs of a plant being in flower in November, the plant was not in flower during that month, but it has been deemed better to leave the notice for that month blank than to insert anything conjecturally, though it may be presumed that when it was in flower in October and December, it was so in November.

Our best thanks are due to the Rev. J. Sowerby for the trouble he has taken. Not only has a good list been kept of plants in flower but an unusual number of new plants and new localities have been discovered.

In addition to Rev. J. Sowerby our thanks are due to the following for aid rendered in making our Lists as full as they are

Rev. J. B. Angell, H. J. Connor, H. A. Evans, Esq., F. H. Evans, J. B. Fuller, O. F. Jacson, W. M. H. Milner, F. Newland, G. F. Rodwell, Esq., H. T. Rogers, A. H. G. Skrine, H. J. C. Smelt, F. Storr, Esq., F. E. Thompson, Esq., A. E. Townsend, C. M. Wilkins.

NEW PLANTS.

Lythrum Salicaria—Axford Marsh, F. Storr, Esq.

Dipsacus pilosus—Plentiful on the Hill beyond Axford on the road to Ramsbury, F. Storr, Esq.

Campanula patula—Field between the Pewsey road and the Wan's Dyke, Rev. J. Sowerby.

Linaria elatine—Occupation road between Granham and Clatford Park Farms, Rev. J. Sowerby.

NEW LOCALITIES.

Medicago sativa—Between Burbage and Savernake Forest, Sep. 14th, Rev. J. Sowerby.

Melilotus arvensis—Heath near Lockeridge, Rev. J. B. Angell.

Trifolium arvense—Between New Mill and Pewsey, Rev. J. Sowerby.

Vicia gracilis—Field near archway opposite Granham Farm, W. M. H. Milner.

Sanguisorba officinalis—Canal bank between Savernake and Crofton, J. B. Fuller. This plant had been removed from our list, not having been met with for several years—but we are glad to be able to replace it.

Peplis portula—Cockatroop Lane, Savernake Forest, H. A. Evans, Esq. Ponds near the Obelisk, Savernake Forest, Rev. J. Sowerby.

Spergula arvensis—Waste heap at the bottom of Granham Hill, Rev. J. Sowerby—only a casual.

Epilobium augustifolium—Edge of the Forest between Savernake and Great Bedwyn. Plentiful, Rev. J. Sowerby.

Monotropa hypopitys—Pine wood, N.W. of Axford in the direction of Ogbourne, Rev. J. Sowerby.

Teucrium scorodonia—Near Savernake House, Sep. 12th. Rev. J. Sowerby.

Chenopodium rubrum—Waste heap at the bottom of Granham Hill, Rev. J. Sowerby—only a casual.

Spiranthes autumnalis—Between Tottenham and Crofton, Rev. J. Sowerby.

Besides the above *Mentha piperita* is said to have been found near Elcot Mill by Rev. J. Sowerby, but as there is some doubt about it, it has been deemed best not to insert it for the present.

In the subjoined list a, s, o, n, d, are used to indicate that the plant was in flower in August, September, October, November, December respectively. aa that it was plentiful, aaa that it was very plentiful in August. Similarly for ss &c. When a letter is in brackets, e.g. (n), it indicates that actual flowers were discovered, but that the plants were really in seed.

Thaliotrum						Cardamine					
flavum	a	—	—	—	—	hirsuta.....	—	—	—	—	d
Ranunculus						Sisymbrium					
heterophyllus ...	a	—	—	—	—	officinale	a	s	—	—	d
flammula	a	—	—	—	—	Alliaria					
acris.....	aa	s	—	—	d	officinalis.....	—	s	—	—	—
repens	aa	s	—	n	d	Brassica					
bulbosus	—	s	—	—	d	oleracea	a	s	—	—	—
arvensis	a	s	—	—	—	campestris	a	—	—	—	—
Caltha						Sinapis					
palustris	—	s	—	—	d	arvensis	aa	s	—	n	d
Papaver						alba	a	s	—	—	d
rhœas	aa	s	—	—	d	Armoracia					
dubium	—	s	—	—	—	*rusticana	—	s	—	—	—
Lecoqii.....	—	s	—	—	—	Lepidium					
Chelidonium						campestre	a	s	—	—	—
majus	aa	s	—	—	—	Capsella					
Fumaria						bursa-pastoris...	a	s	—	n	d
officinalis.....	a	s	o	—	d	Senebiera					
Nasturtium						coronopus	—	s	—	—	—
officinale	—	s	—	—	—	Raphanus					
sylvestre	—	s	—	—	—	Raphanistrum	a	s	—	—	d

Reseda					
lutea	a	—	—	—	—
Helianthemum					
vulgare	a	s	—	—	—
Viola					
Riviniana.....	—	(s)	o	—	—
tricolor	a	s	—	n	—
(var) arvensis...	a	s	—	n	d
Polygala					
vulgaris	—	s	—	—	—
Saponaria					
officinalis.....	—	s	—	—	—
Silene					
inflata	—	s	—	—	—
Lychnis					
flos-cuculi	a	s	—	—	—
vespertina	a	s	—	—	—
diurna.....	a	s	—	—	d
Githago	a	s	—	—	—
Sagina					
procumbens ...	a	s	—	—	—
Arenaria					
trinervis	a	—	—	—	—
serpyllifolia.....	—	s	—	—	d
leptoclados	a	—	—	—	d
Stellaria					
media	a	s	—	—	d
graminea.....	a	s	—	—	—
Cerastium					
glomeratum ...	a	s	—	—	d
triviale	a	s	—	n	d
Malachium					
aquaticum	—	s	—	—	—
Malva					
moschata.....	a	s	—	—	d
sylvestris	a	s	—	—	d
rotundifolia.....	a	s	—	—	d
Hypericum					
quadrangulum...	a	s	—	—	—
perforatum	a	s	—	—	—
humifusum	—	s	—	—	—
hirsutum.....	a	s	—	—	—
pulchrum.....	a	s	—	—	—
Geranium					
Phæum	a	—	—	—	—
pratense	a	s	—	—	—
dissectum	a	s	o	—	d
columbinum ...	a	—	—	—	—
molle	a	s	o	n	—
Robertianum ...	a	s	—	n	d
Linum					
Catharticum ...	a	s	—	—	—
Ulex					
Europæus	—	—	—	n	d
nanus	—	s	—	—	—
Ononis					
arvensis	a	s	—	—	—
Medicago					
lupulina	a	s	—	—	—
Trifolium					
pratense	a	s	—	n	—
*incarnatum ...	a	s	—	—	—
arvense.....	a	s	—	—	—
repens	a	s	—	—	—
procumbens.....	a	s	—	—	—
minus	a	s	—	—	—
Lotus					
corniculatus.....	a	s	—	—	—
Anthyllis					
vulneraria	a	s	—	—	—
Vicia					
Cracca	a	s	—	—	—
sepium	a	s	—	—	—
sativa	a	s	—	—	—
gracilis.....	a	—	—	—	—
Lathyrus					
pratensis	a	s	—	—	—
Hippocrepis					
comosa.....	a	—	—	—	—
Onobrychis					
sativa	a	s	—	—	—
Spiræa					

ulmaria	a	s	—	—	—	
Filipendula	a	—	—	—	—	
Sanguisorba						
Officinalis	—	s	—	—	—	
Poterium						
Sanguisorba ...	a	—	—	—	—	
Agrimonia						
eupatoria.....	a	s	—	—	—	
Alchemilla						
vulgaris	a	—	—	—	—	
arvensis	a	—	—	—	—	
Potentilla						
anserina	a	s	—	—	—	
reptans.....	a	s	—	—	—	
Tormentilla.....	a	s	—	—	—	
Rubus						
Idæus	a	s	—	—	—	
discolor	a	s	—	—	d	
cæsius	a	s	—	(n)	—	
Geum						
urbanum	a	s	—	—	d	
Rosa						
arvensis	—	s	—	—	—	
Peplis						
portula.....	a	s	—	—	—	
Epilobium						
angustifolium...	—	s	—	—	—	
parviflorum	a	s	—	—	—	
montanum	a	s	—	—	—	
hirsutum	a	s	—	—	—	
Circæa						
lutetiana	a	s	—	—	—	
Spergula						
arvensis	a	s	—	—	—	
Helosciadium						
inundatum	—	s	—	—	—	
Sison						
Amomum.....	a	s	—	—	—	
Pimpinella						
saxifraga	a	s	—	n	—	
Sium						
angustifolium ...	a	s	—	—	—	
Œnanthe						
fluviatilis	a	—	—	—	—	
Æthusa						
cynapium.....	—	s	—	—	d	
Angelica						
sylvestris	a	s	—	—	—	
Pastinaca						
sativa	a	s	o	—	d	
Heracleum						
sphondylium ...	a	s	—	—	d	
Daucus						
carota	a	s	—	—	—	
Torilis						
Anthriscus	a	s	—	—	d	
nodosa	a	s	—	—	—	
infesta	a	—	—	n	—	
Scandix						
pecten	—	s	—	—	—	
Anthriscus						
sylvestris.....	—	s	—	—	d	
Chærophyllum						
temulum	a	s	—	—	—	
Hedera						
Helix.....	—	s	—	n	(d)	
Sambucus						
nigra.....	a	s	—	—	—	
Lonicera						
Periclymenum...	a	s	—	—	—	
Sherardia						
arvensis	aa	s	o	—	—	
Asperula						
cynanchica	a	s	—	—	—	
Galium						
Aparine	a	s	—	—	d	
Mollugo	a	s	—	—	—	
verum	a	s	—	—	—	
palustre	a	s	—	—	—	
Valeriana						
officinalis	a	s	—	—	—	
Valerianella						

elitoria	a	—	—	n	—
Dipsacus					
sylvestris	—	s	—	—	—
pilosus	—	s	—	—	—
Knautia					
arvensis	aa	ss	o	n	d
Scabiosa					
succisa	aa	ss	—	n	—
columbaria	aa	ss	—	—	d
Eupatorium					
cannabinum.....	a	s	—	—	—
Erigeron					
acris	a	s	—	—	—
Bellis					
perennis	a	s	—	n	d
Solidago					
virgaurea	a	s	—	—	—
Inula					
conyza	—	s	—	—	—
Pulicaria					
dysenterica	—	s	—	—	—
Bidens					
cernua	—	s	—	—	—
tripartita	—	s	—	—	—
Achillea					
Millefolium	aa	ss	—	n	d
ptarmica	—	s	—	—	—
Anthemis					
arvensis	a	s	—	—	—
? cotula	a	s	—	—	d
Matricaria					
inodora	a	s	—	n	d
Chrysanthemum					
Leucanthemum	a	s	—	—	—
segetum	a	s	—	—	—
Artemisia					
vulgaris	a	s	—	—	—
Tanacetum					
vulgare.....	a	s	—	—	—
Filago					
germanica	a	s	—	—	—
Gnaphalium					
uliginosum	a	s	—	—	—
Senecio					
vulgaris	aa	s	—	n	d
Jacobæa	aa	s	—	n	d
aquaticus.....	a	s	—	n	d
sylvaticus	—	s	—	—	—
Carlina					
vulgaris	a	—	—	—	—
Arctium					
? majus.....	a	s	—	—	—
Centaurea					
nigra	a	s	—	n	—
cyanus	a	—	—	—	—
scabiosa	a	s	—	—	—
Carduus					
nutans	aa	ss	o	—	d
crispus	aa	ss	—	n	d
lanceolatus	aa	ss	—	—	(d)
eriophorus ...	aa	s	—	—	—
arvensis	aa	ss	—	—	—
palustris	aa	ss	—	—	—
acaulis.....	a	s	—	—	—
Lapsana					
communis	a	s	—	—	d
Hypochœris					
radicata	a	s	—	—	—
Apargia					
hispida	a	s	—	n	d
autumnalis ...	aa	ss	—	n	d
Tragopogon					
minor	a	s	—	—	—
Picris					
hieracioides.....	a	—	—	—	—
Leontodon					
taraxacum	a	s	—	n	d
Sonchus					
oleraceus	—	—	—	(n)	d
asper.....	a	s	—	n	d
arvensis	a	s	—	—	—
Crepis					

virens	a	s	—	n	d	
Hieracium						
pilosella	a	s	—	—	—	
vulgatum	a	s	—	—	—	
boreale.....	—	s	—	—	—	
Phyteuma						
orbiculare	—	s	—	—	—	
Campanula						
patula	—	s	—	—	—	
glomerata	a	s	—	n	—	
Trachelium	—	s	—	—	—	
rotundifolia.....	a	s	—	—	—	
Calluna						
vulgaris	a	s	—	—	—	
Monotropa						
Hypopitis	—	*Seed*	—	—	—	
Erythræa						
centaurium	a	s	o	—	—	
Gentiana						
amarella	a	s	—	—	—	
campestris	a	s	—	—	—	
Convolvulus						
arvensis	a	s	—	—	—	
sepium	a	s	—	—	—	
Cuscuta						
Trifolii	—	s	—	—	—	
Cynoglossum						
officinale	—	s	—	—	—	
Lycopsis						
arvensis	a	s	—	—	—	
Symphytum						
officinale	aa	s	—	—	—	
asperrimum.....	—	s	—	—	—	
Echium						
vulgare	a	s	—	—	—	
Lithospermum						
arvense	a	—	—	—	—	
Myosotis						
palustris	a	s	—	—	—	
arvensis	a	s	—	—	d	
Solanum						
Dulcamara	a	s	—	—	—	
Hyoscyamus						
niger	—	s	—	—	—	
Verbascum						
Thapsus	a	s	—	—	—	
Linaria						
cymbalaria	—	s	—	—	—	
minor	a	s	—	—	—	
vulgaris	a	s	—	—	—	
elatine	—	—	o	—	—	
Scrophularia						
nodosa	a	s	—	—	—	
aquatica	a	s	—	—	—	
Melampyrum						
pratense	a	s	—	—	—	
Pedicularis						
sylvatica	—	s	—	—	—	
Euphrasia						
officinalis.....	a	s	—	—	—	
odontites.....	a	s	—	—	—	
Veronica						
Scutellata	—	s	—	—	—	
Anagallis	a	s	—	—	—	
Beccabunga.....	a	s	—	—	—	
Chamædrys	—	—	—	(n)	—	
serpyllifolia.....	a	s	—	—	—	
arvensis	a	s	—	—	d	
agrestis.....	—	—	—	—	d	
polita.....	a	s	—	—	d	
Buxbaumii	a	s	—	n	d	
Mentha						
Pulegium.....	a	s	—	—	—	
rotundifolia.....	a	s	—	—	—	
aquatica	a	s	—	—	—	
arvensis	a	s	—	—	—	
sativa	a	s	—	—	—	
? piperita	a	s	—	—	—	
Lycopus						
Europæus	a	s	—	—	—	
Salvia						
verbenaca	—	s	—	—	—	

Origanum						
vulgare	a	s	—	—	—	
Thymus						
serpyllum	a	s	—	—	—	
Calamintha						
officinalis...	—	s	—	—	—	
acinos	—	s	—	—	—	
clinopodium ...	a	s	—	—	—	
Prunella						
vulgaris	a	s	—	—	—	
Nepeta						
cataria.....	a	—	—	—	—	
Lamium						
incisum	—	s	—	—	—	
amplexicaule ...	—	—	o	—	d	
purpureum	a	s	—	n	d	
album	a	s	—	n	d	
Galeobdolon ...	—	s	—	—	—	
Galeopsis						
Ladanum.....	a	s	—	—	—	
Tetrahit	a	s	—	—	d	
Stachys						
Betonica	a	s	—	—	—	
sylvatica.....	a	s	—	—	—	
palustris	a	s	—	—	—	
Ballota						
fœtida	a	s	—	—	—	
Teucrium						
scorodonia	a	s	—	—	—	
Verbena						
officinalis	—	s	—	—	—	
Primula						
vulgaris	—	—	—	n	d	
Anagallis						
arvensis	a	s	—	—	—	
Plantago						
lanceolata	a	s	—	—	—	
media	a	s	—	—	—	
major	a	s	—	—	—	
Chenopodium						
album	a	s	—	—	—	

Bonus-Henricus	a	—	—	—	—	
Atriplex						
angustifolia.....	a	s	—	—	—	
Rumex						
obtusifolius.....	a	s	—	—	—	
crispus.....	a	s	—	—	d	
acetosa	a	—	—	—	—	
Polygonum						
Bistorta	—	s	—	—	—	
amphibium	—	s	—	—	—	
Persicaria	a	s	—	—	—	
aviculare	a	s	—	—	—	
convolvulus.....	a	s	—	—	—	
Euphorbia						
Helioscopia ...	a	s	—	—	d	
amygdaloides ...	a	—	—	—	—	
Peplus	a	s	—	—	d	
Urtica						
urens	a	s	—	—	d	
dioica	a	s	—	—	—	
Spiranthes						
autumnalis.....	a	s	—	—	—	
Epipactis						
latifolia	a	—	—	—	—	
Ruscus						
aculeatus.....	—	—	—	—	d	
Colchicum						
autumnale	a	s	—	—	—	
Juncus						
glaucus	—	s	—	—	—	
lamprocarpus ...	a	s	—	—	—	
bufonius	—	s	—	—	—	
Alisma						
plantago	a	s	—	—	—	
Sparganium						
simplex	a	—	—	—	—	
Phleum						
pratense	a	—	—	—	—	
Alopecurus						
pratensis.....	a	—	—	—	d	
agrestis	a	s	—	—	d	

Holcus										
lanatus.....	a	s	—	n	(d)					
Poa										
annua	a	s	—	n	d					
pratensis	a	—	—	—	—					
Glyceria										
plicata	a	s	—	—	—					
Briza										
media	a	—	—	—	—					
Cynosurus										
cristatus	a	—	—	—	—					
Dactylis										
glomerata	a	s	—	n	d					
Festuca										
gigantea	—	—	—	—	d					
Serrafalcus										
mollis	a	s	—	—	—					
Lolium										
perenne	a	s	—	—	d					

ORNITHOLOGY.

The Section is at present non-existent, but two notices are worth recording.

An uncommon variety of the Hobby (*Falco subbuteo*) was captured by H. A. Evans, Esq., in the College grounds. Its wing had been badly broken some time before it was caught.

A specimen of the Spotted Crake (*Crex porzana*) was picked up Sep. 12, 1872, near the Roebuck Inn, and secured for the College museum by Mr. Coleman. It had probably killed itself against the telegraph wires. This species is new to the College List.

DONATIONS, &c., TO THE MUSEUM.

Archæology.—	
Coin of Henry VIII	purchased.
Roman Coin	Mr. Perkins.
Indian Coins	H. C. Spry, Esq.
Botany.—	
Collection of Chinese Plants	C. W. Everard, Esq.
Collection of British and European Plants	E. Meyrick.
Models of Indian Fruits	H. C. Spry, Esq.
Entomology.—	
Samples of Cochineal	C. W. Houghton, Esq.
Two cases of Indian Moths and Butterflies	Capt. R. B. Reed.
Hornets' Nest from Shillingstone, Dorset ...	Rev. A. E. Dayman.
Wasps' Nest	W. Fergus, Esq., M.D.
Ornithology.—	
Hobby, caught in the College grounds ...	H. A. Evans, Esq.
Kingfisher	Mr. Perkins.
Collection of British Birds	E. F. Im Thurn, Esq.
Pair of white Pheasants—stuffed	Mr. E. Gauntlett.
Indian Birds	A. G. C. Carnegy.
Various.—	
Various articles of Indian Manufacture and Ornament	H. C. Spry, Esq.
Fossil teeth of Fish, and various curiosities from the Grand Canary ...	C. W. Houghton, Esq.
Portion of Original Atlantic Cable... ...	G. F. Rodwell, Esq., F.C.S., &c.
Skin of *Mus dimidiatus* from Aden ...	W. O'N. Lindesay.
Library.—	
Akerman's "Numismatic Illustrations of the New Testament" ...	F. Madan, Esq.
Smee's "My Garden"	Rev. C. Soames.
Linnean Society's proceedings	F. E. Hulme, Esq., F.L.S.
"Science Gossip," and "Popular Science Review"	Rev. J. M. Fuller.

REPORTS.

No. printed	400
Sold	283
Honorary Members	50
Given away	54
In hand	13
	400

ACCOUNTS.

	£	s.	d.		£	s.	d.
Balance in hand ...	31	4	1	Prizes	2	13	0
Subscriptions	5	10	6	Library Account ...	3	7	8
Arrears	4	1	0	Museum Account ...	1	1	0
Donations	1	2	0	Printing Account ...	36	0	0
By Sale of Report ...	42	9	0	Plates for Report ...	2	3	9
By Sale of 'Antiquities'	5	5	0	Field Day	6	0	0
For Field Day	6	0	0	Etceteras	0	9	2
				Balance in hand ...	43	17	0
	£95	11	7		£95	11	7

NOTES ON A VISIT TO BRAZIL,

BY THE REV. T. A. PRESTON.

SINCE I left England I have seen so much that I am almost at a loss what special experiences to select for the account of my journey. And if my remarks should seem disconnected, if I appear to ramble aimlessly from one topic to another, you must attribute it, not to the lack, but to the superabundance of my materials.

The time occupied in the journey from England to Brasil is about three weeks. From the commercial connections which exist between Portugal and Brasil, the relations between the Portuguese and Brasilians are most intimate. Hence there is always a large number of Portuguese passengers of whom I wish I could give a more favourable account. But common justice requires me to state that their manners are extremely disagreeable, and their persons (owing to a heavy tax upon soap) scarcely less so. It is not a little trial to be confined within a space of limited dimensions with these gentlemen. It is, if possible, a yet greater trial to become the occupant of the berth which one of them has just vacated. After leaving Lisbon the first place at which we stopped was the island of St. Vincent, one of the Cape de Verdes, and as nearly as possible halfway between Lisbon and Pernambuco. This is the coal depot of the Royal Mail Packet Company and their ships stop here for the purpose of coaling as well as for landing any passenger who may wish to go to any of the neighbouring islands. The island itself is nothing more than a rock, sparsely covered with green after rain, but as this sometimes does not come for three years, and as the sun's rays beat down with intolerable force, the general appearance is that of utter sterility, at least on the side at which we stopped, for I was told that on the other side things were not quite so bad, and that even a few cattle could be reared; the supply of fruit and cattle is obtained from the other Islands of the same group, that of St. Antonio, facing the mouth of the bay in which we stopped, being very fertile; but St. Vincent is selected as the place for stopping at from its excellent bay

and anchorage. At the centre of the mouth of this bay is a curious rock, called the Bird Rock, about 200 feet high I believe, rising out of the water, as has been well remarked, like a miniature Matterhorn, rendered more similar to it by its being the safe refuge of birds at night or in stormy weather, which causes the upper part to appear as if covered with snow.

The tropical glare is intensified by the absence of all shade, for trees refuse to grow on such an unkindly spot. In fact there is no soil, the burial ground is even obliged to be made in the sand at some little distance from the town. A small group of *Tamarisks* grow in one sandy spot, and as you walk along you can detect a few straggling plants, generally very prickly ones, of the *Spurge* and *Nightshade* families. On one spot we saw where an attempt had been made to grow some trees, but with apparently very little success. They had been planted in tubs placed in holes hewn out of the rock, as the only means of giving them any chance of growing. There appeared to be one or two gardens, but so carefully walled-in that it was impossible to see how far the owners had been successful in their attempts, though the few shrubs which overtopped the walls seemed to offer some encouragement. The only *tree* I saw was a cocoa-nut, about 13 feet high, which had been planted in what I suppose I must call the "Square." The poor thing had evidently a hard struggle to keep alive.

Close by the shore nestles the "town" of St. Vincent, consisting mainly of one street, the houses of which are especially remarkable for being generally unfinished, a great characteristic of the Portuguese being to begin a house and then find that they have not enough money to complete it. There was a Hotel, a Custom House, a Church, a Hospital, and an unfinished Theatre, all but the first looking very grand from the sea. The Hotel was patronised by one or two of our passengers, and pronounced not very successful; as we passed the house, the principal thing that struck the eye (as in fact in almost all the "stores") was an enormous display of Bass' Bottled Ales, and that *must* be good, otherwise it will not stand the climate, but of course its price is considerable: in fact it is a curious sight to see the numbers of people who come on board wherever the ship stops, in order to do "business" with some of the passengers, this business consisting mainly in having a drink at the bar, as the articles supplied by the ship's company are very good and very reasonable—far more so than on shore; the great objection, however, with these good people being that they must pay down on the spot for what they have. The Custom house is a dreary looking building with large closed doors very seldom opened, I should think. In this building is also the Post Office; one of the passengers who landed with me called there to enquire about a letter which he had put into the box a year before—on examination it was found where it had been placed. I believe that some excuse was made about

"insufficient payment," but of all nuisances that of postal arrangements seems the very worst in all these kind of places.

The Church was a very rough looking building inside ; of course attempts were made to decorate the place, but all indicative of extreme poverty : a large placard caught the eye on entering requesting aid for the purchase of lights, as they were so expensive. We did not go to the Hospital, though I have every reason to believe that its arrangements were good.

The supply of water for the use of the inhabitants is obtained from a few springs and wells. The latter are deep and built over so as to be situated in the centre of a kind of hall. A rope and bucket serves for getting up the water, each person bringing his own. It is a slow process, but time must hang heavily on their hands and they must be glad of any means of "killing" it.

On the outskirts of the town are a few houses, perched up on the hills, one of these being inhabited by the English Agent, whose lot must be deserving the greatest commiseration.

The inhabitants of this rock, such of them at least as are not Europeans, are negroes, but of different hues. Those employed by the government are generally very fine men and quite black ; those more particularly belonging to the island being more coppery with very frizzly hair, which twists up into tight little curls when wetted, and so does not present the appearance of having been in the water. Clothes especially among the children, seem unnecessary. They are a lazy set, their great source of livelihood being what they can get by diving, at which they are very expert. The water of the bay is very clear and very deep, and if a piece of money be thrown in, it can be secured long before reaching the bottom. The divers make a very good harvest whenever a vessel stops there—quite enough to keep them in idleness till another comes. We could not, however, help envying them their occupation, as the sun came streaming down on our heads. It may be presumed that there are no dangerous fish in the bay, though as I looked down from the ship's deck, I saw numbers of fish flitting to and fro beneath me, and when the steward took on board his supply of fresh fish, we were all struck with the variety and beauty of their colours and their extraordinary shapes. It was, however, useless trying to get any information about them, the general reply to all questions about fish or birds being " there are several kinds of these fish (or birds,") a most important piece of information, but hardly satisfactory to an enquiring mind. I said that there were no dangerous fish, this is generally the case, though occasionally one makes his appearance and until he is caught, no diver will venture into the water. The following story was told me by one who had seen the event. The coals are brought to the ship's side in sacks, which are hauled up upon deck and when the coaling is

finished, the empty sacks are thrown into the lighter which brought them and counted at the same time. Occasionally one of these sacks is thrown into the water instead of the lighter, and when the counting is finished, these divers are paid a small sum for bringing it up. On the occasion referred to, the diver seemed to be longer than usual in coming to the surface, and on looking over the side of the vessel, he was seen being carried off by a "devil fish" (what sort of fish this is I cannot make out). It was long before a diver went into the water again.

Though the divers will bring up a sack for a penny, yet they will not go after any coin less than 6d. in value, on my return a few of the nickel coins of Brasil were thrown in, but were hurled back at us as soon as fished up.

A fact about these natives, which struck most of us, I for one venture to mention. As they plunge down and turn the soles of their feet towards you, you may see that the skin of the soles is of a much lighter hue than that of the rest of the body. What the reason of this is, it is difficult to say. I am told it is the usual case with all negroes. Upon asking the ship's Doctor whether they were born with those very light soles, he told me no. I have since been told, and, in fact, my own observation as far as it went tended to confirm this second statement, that they *are* born with them. If the former statement be true, the theory of one of our passengers could not be so very amusing, that by rubbing these niggers with sand-paper, you could turn them white. This theory is, however, impossible, as the outer skin is not that which has the colour. The lighter colour again of the sole extends too far up the sides of the foot to make it possible to be caused by wear. In fact there is no doubt but that this lighter colour of the soles is natural, and I have ventured in thus discussing what seems a self-evident fact, mainly to show how very difficult it is to get to the bottom of any scientific fact, and that we must therefore *observe for ourselves* and not place implicit faith in anything that is told us.

There is no doubt but that these negroes are not very high in the scale of humanity, but though I tried to confirm the observation of Mr. Longman that they seemed so very ape-like that it was no very great stretch of imagination to believe that they must have come from apes and thus help on Mr. Darwin's theory, I certainly *could* not agree to it. I was anxious to know the opinions of my fellow travellers and but very few of them seemed to trace much ape-like appearance in them. Of course this is a matter of opinion, but so much of the Darwinian theory is founded upon *opinion*, the way in which facts are interpreted, that I have ventured to give my own in opposition to what I feel must be of some weight with those who read Mr. Longman's very interesting account of his visit to Brasil.

After six days we arrived at our next station, Pernambuco, crossing the line in our way. The speed with which the steam vessels go renders it impossible to collect anything on the way. I was not very successful in seeing many objects and in fact but very few were seen. Flying fish were numerous at times, but only one of these jumped on board. It was very difficult to form any judgment as to how far they could fly out of the water, but, as a rule, the distance was very short. They are excellent eating and the one which visited us was served up the next day at the Captain's table. The "phosphorescence" of the sea, about which one reads so much, was comparatively seldom seen: only once did I see it in perfection and that was on my return journey after a very hot, calm day. The heat was not nearly so great as I had anticipated, partly from the speed with which the vessel was going and partly from breezes with which we were favoured, but I could not help being struck with the intensity of the sun's rays when coming down vertically, they seemed to pierce through awnings and everything, and nothing gave me a better idea of the real cause of our summer heat, when the rays come more directly from over-head, than this experience of the equatoreal rays.

On one other point I had to alter my ideas, viz., about the Doldrums. For some distance North and South of the equator I had been led to expect a calm, and I had vivid recollections of sailing vessels lying becalmed for days together under the burning sun, that it was to the Doldrums, in fact, that the lines of the ancient mariner applied "we lay just like a painted ship upon a painted Ocean." "Regular Doldrum weather" is, however, very different from this; stormy wind and drenching rain prevailing as long as we were passing through these Doldrums and forming perhaps the most unpleasant part of the voyage, for it is impossible to remain on deck and one is forced to mingle with the Portuguese passengers, or box oneself up in the cabin. The rain has this advantage, that it keeps down the sea, and thus those who are not partial to a tossing vessel derive considerable satisfaction from the presence of the rain.

Before reaching Pernambuco however we passed the Island of Fernando Noronha, which serves as the Brazilian Botany Bay, to which the Brazilians export their convicts. An amusing story was told me in connection with it, which serves to illustrate the Brazilian ignorance of navigation. Owing to the character of the island and the use to which it is put, it has been found impossible to raise enough sustenance on the island itself to supply the wants of the convicts. It is, therefore, necessary to export from time to time such provisions as are needed from the mainland. At the stated period one of these ships sailed duly with its freight of provisions, and after a lapse of three weeks returned. "What have you been about?" was the eager question addressed to them on their return, and why did you not come back

before?" "why," said the sailors, "we've been for these three weeks sailing about after that there blessed island, and we can't make out nothing about it except that it's gone to the bottom of the sea!"

We reached Pernambuco so early, that we had to wait till it was light, ere going as near as possible to the shore. The most remarkable feature is a curious reef which runs nearly parallel with the shore for 100 miles or more, forming a very good harbour inside, but at present it cannot be used for large ships, as the entrance is very bad. A large sum of money has been voted for improving the harbour and its approaches, but, like all these things among the Brazilians, they are waiting "till to-morrow" to begin. Outside this reef are several sand banks, and large vessels have to anchor as much as a mile from the shore: this fact involves the necessity of having large lighters for carrying the cargo ashore, as the navigation is generally very difficult, and it consequently adds largely to the expense of the goods. The whole force of the Atlantic spends its fury here, and even in the greatest calm the surface of the water is scarcely smooth, almost realizing the words of our great poet

> Listen! the mighty being is awake
> And doth with his eternal motion make
> A sound like thunder—everlastingly.

Even in what are called "ordinary seas," the swell is so great that on going down the ladder to get into the shore boat, unless you are very quick, you may be drenched up to your knees, before you are aware of it by a large swell breaking against the vessel's side: in fact ladies are generally let down in chairs, to avoid the chance of meeting this swell. An ordinary boat load requires nine men, and even then passengers are not unfrequently drenched whilst turning round the reef into the harbour. In rough weather it is of course very dangerous at times to land, and the French mail packets have been known to decline landing the mails or sending for them from the shore. Shortly before our arrival a French mail had been upset and the crew fortunately saved by a steam tug that happened to be passing. Another boat was also upset and four of the crew were dragged down by sharks before assistance could arrive from the shore. In fact these sharks are quite as great a terror as the rough weather. On my return journey we had to stay 12 hours off shore, doing nothing, as we had no cargo to land or to take no board, and by the rule of the company 12 hours' day-light must be given between the arrival and departure of a mail packet. It happened to be an intensely hot calm day and we amused ourselves by trying to catch a shark, as many as four of them being visible at once basking in the sun; our bait, consisting of about 3lb. of pork, *would* lie too close to the vessel and in no way could we get it far enough away and the ugly monsters did not care to venture near

enough to see the bait but generally rested with their triangular back fin out of the water about 100 yards off.

The town of Pernambuco was built by the Dutch, and this accounts for the very high pointed roofs of the houses. From the sea it presents a very gay appearance, no two contiguous houses being of the same colour—blue, red, yellow of various tints are perhaps the commonest, but you not unfrequently come across a house or wall covered with Dutch tiles, such as you see covering old-fashioned fire-places. The heat is so intense that paint or white-wash very soon cracks off, and this heat, succeeded by the heavy tropical rain, soon causes the houses to have generally a very shabby look. They require re-colouring at least every year, and it is for this reason that they often cover them with these glazed coloured Dutch tiles to which I have referred. They certainly present a better appearance than the shabbily-painted walls, and the eye soon gets accustomed to them. The town itself is of considerable size—larger than it appears from the sea—for the whole country is generally very flat for some miles inland. It might, perhaps, be cleaner, but I have seen European towns in a worse state. Being the great emporium for all the northern part of Brazil, trade is brisk and there are some very good shops, in fact the inhabitants think that they have streets superior to those in Rio, and the town, as a whole, impressed me favourably. They have adopted tramways, and there is a small railway to which I will presently allude. We could not help remarking on the number of houses completely burnt out. It appears that there was rather a mania with some people for burning their houses after insuring them. The last case was so flagrant that the Insurance Company declined payment, and this seems to have served as a caution to others.

We here saw true slaves for the first time. They were walking along in single file, with scarcely a rag of clothes on, and each one carrying a brown bag on his head. This bag contained sugar, bag and man being of one hue, and covered with exudations from the sugar inside the bag. The men were remarkably fine and muscular, and seemed quite capable of thrashing their owners, if the idea seized them.

One of our passengers being a Director of the small line of railway, he kindly procured for us a special train to take us up the country. The line itself is about 12 miles long, the terminus at present consisting of a few houses. I believe it is intended to continue it further to the various plantations in the interior. The whole affair is however on a very small scale. The engine was unable to carry more water than would serve for a six miles' journey, so that we had to stop going and returning to water the horse. The rails are laid down with the most scrupulous care not to interfere with pigsties or cottages, or to alter the undulating surface of the ground, and it was exceed-

ingly interesting to observe all the beautiful curves and ups and downs along the route. Where practicable it runs beside the high road, but without any attempt at a boundary wall, consequently in addition to the vagaries of the line travellers can see the manners and customs of the natives, especially of the children, as the fine open road for the railway serves as an admirable playground. A heavy punishment is inflicted upon the engine driver (especially if an Englishman) if any accident occurs to a child, and a double punishment if that child is a black, hence an incessant whistle has to be kept up, very agreeable no doubt when in moderation, but rather destructive of comfort when continued incessantly for the whole journey. Still there was much to see—we passed through wooded places interesting to all, but more so to one who could appreciate the plants. There was but little extent of view, but every now and then, from some higher ground, we obtained a nice glimpse of the country down to the ocean. Along the road-side in the ditches grew plants seen only in our very hottest hot-houses, but, as is always the case, at the times when I most wanted to get out, we were sure to be going at our greatest speed. It was then mid-winter, and though we saw numbers of plants in flower, the sight must be something magnificent in summer. I was particularly struck with the numbers of scarlet flowers, and of plants which have scarlet leaves, such as the *Poinsettia* and other spurges, now becoming so common in our greenhouses. Whilst waiting for the train I made acquaintance with the castor oil plant, here a regular tree. This is perhaps one of the very common plants wherever I went in Brazil. It is not that the natives require the oil for medicinal purposes, but until gas was introduced, it was the main source of the oil used for burning. Since the introduction of gas it is now usually left to grow where it will, as a weed. Here, also, I made acquaintance with one of the sensitive plants, common in what I must call the hedges; the mango, with its intense deep shade, and large spreading branches; and with numerous palms, the most peculiar of which was perhaps the *Fan Palm*. When young especially, the leaves, which are long and narrow, and are situated on long stalks, are arranged just like a fan, and have a very pretty appearance. Gardens, as a rule, are failures; vegetation is so rank that unless constant attention is paid to them they soon present an untidy appearance. Pernambuco is the great centre for really good pine apples. On my return journey I purchased a dozen for sixteen shillings. When at Southampton I wanted to get a few more, as they had travelled better than usual, but the price had risen to five shillings each. If the season has been wet before buying them, then there is very little chance of their keeping till reaching England; but if it had been fine they keep very well. I was strongly advised not to get more than a dozen, but I was sorry for it, as I

only lost two, and so might well have taken more to distribute among my friends.

The people here, as elsewhere, know how to study their own interests. After leaving the train to look about, we went to an "hotel" and ordered a light lunch; we had beefsteak, cold fish, guava marmalade, and of course Bass's ale. The first was so atrocious that those of our party who ventured to eat it had to retire at once. I think for the lunch we had to pay 6s. a head, though the first charge was considerably more; this added to 8s. a head for landing and getting on board, made, in one sense, an expensive trip: though after the continual sight of sea we were very glad of the opportunity, and no one grudged the money, I am sure. With the exception of our lunch (which was, however, rather amusing than otherwise), our recollections of Pernambuco and its inhabitants were exceedingly pleasant.

After a very pleasant run of two days we reached Bahia. The town (the name of which means *Bay*) is situated on the north side of the Bay of All Saints, which is there closed in by high hills, on the top of which the habitable portion of the town is situated, the business portion being built on the narrow strip of land between the hills and the bay. The south side of the bay is quite flat, but the view on entering is nevertheless very fine and picturesque. Of course we landed to see the town and the shops, for passengers are recommended to buy all the humming birds, insects, and feather flowers here in preference to Rio, as they are so very much cheaper. We, however, merely inspected the articles, intending to purchase on our return home. Here, too, they have started tramways, and a company were also building an hydraulic lift for getting up men and goods to the top of the hill, which certainly is very steep. As soon as we reached the foot of the hill we had our first experience of the enervating influences of a hot climate, for we were surrounded with most gorgeous Sedan chairs, which some of our party patronised, being carried up the hill for 1s., many of us preferred walking up and looking about for ourselves, but the bearers must derive a thriving traffic, for the people are so lazy that but very few ever dream of ascending to the top on their own legs, and the porters are unrivalled even in England in their endeavours to get a passenger. In a rubbish heap at the top I saw several plants of the common Sow Thistle, (*Sonchus oleraceus*), which at first I imagined must have sprung from seeds in ballast, but from having found it several times afterwards, I am inclined to think it not improbably indigenous. Common as the plant is, it is wonderful how old associations cling to it, especially if it be the only British plant near. Later on, when I once came across a quantity of the common Poa grass (*Poa annua*), some miles from Rio, a whole flood of recollections of one's Marlborough life

flashed up, and certainly these home memories are perhaps as pleasing a part of the study of Botany in a foreign land as one can well imagine.

At the top of the hill we took to the tramway, and we then for the first time realised the want of small coin. Almost the whole coinage of Brazil consists of paper money. Latterly a few nickel coins have been introduced, in addition to the few clumsy copper pieces, worse than our old "cartwheel" twopennies; and there are such things as silver and gold pieces; but the former are *very* scarce, and of the latter I only saw one specimen, and that was in the Museum at Rio, so that we may fairly say that paper money is the universal currency. The lowest paper value is a *milreis*,—*i.e.*, 1000 reis, of which about 9½ go to the sovereign, consequently smaller sums are very difficult to manage. In the tramway you offer a milreis, and get in return a number of their tickets, and these tickets are as good as regular coins elsewhere in the same town. It was curious to see in the plate carried round at church a number of these tickets, but they are the recognised means of exchange, and very useful ones too.

Of course the view from the top of the hill is magnificent, especially from the public gardens, where you overlook the Bay and miles beyond it. The rapidly sloping ground in front clothed with trees and interspersed with buildings certainly adds to the beauty of the scene.

They have a very good market at Bahia, where fruits of all kinds are procurable, but the most astonishing sight is the negro women. They certainly reach the very height of development and look like mountains beside the men, and are certainly capable of "holding their own" in any question of woman's rights. To see one of them get up from the ground with a heavy basket of fruit on her head, twisting about so as to keep the basket steady without touching it with her hands is a sight worth seeing.

We here tasted the mango, a fruit something like a green orange in appearance and size. I fortunately tasted but a small piece, those of our party who devoured a whole one did so with great delight at first, but when it was all over, they asked whether they extracted *turpentine* from them; they compared the state of their mouths to what they would be if they had been licking a newly-painted door. The fact is that there is a good deal of turpentine in the skin, and it is from an absence of this that the Indian Mangoes are so much better. I was told that if you eat an American Mango, you ought to have a pail of water beside you in which to dip it after every bite.

It was here also we became acquainted with the South American Oranges; and though they are very nice and very juicy, I cannot help giving the preference to European ones for flavour. These oranges are very large with a very thick skin and *very* thick, almost horny, partitions inside; the only way of eating them with any degree of comfort is to cut off the rind com-

pletely, and then cut out the pulp from the different partitions, and afterwards eat it with a spoon; a variety called the *navel* orange is common at Bahia, in this the seeds are all situated at one end of the core, and can be cut off with the rind.

Fever is often very prevalent at Bahia, and the number of "medicos" is astonishing. On my return journey we were put into quarantine because we had taken a few passengers on board at Bahia and were consequently not allowed to land at Lisbon or even at St. Vincent.

I did not observe many new species of plants here (though of course my time was very limited), but I could not help noticing the arrangements round the plants like a double saucer, intended, so I was told, to keep off the ants. They have a very small black ant, which becomes a great pest wherever it establishes itself. Even in one of the British Ships of war, where these animals had established a colony, they were such a pest that the sugar and other articles had to be hung up by threads to protect them.

The most curious plant I saw was the "*gramma*" or grass used for forming lawns, &c. It is an exceedingly coarse grass, forming long runners, rooting at every few inches and sending up a tuft of very broad leaves; where this is planted in quantities, and the runners trained so as to cross one another in all directions, it forms a very respectable lawn—*i.e.*, to *look* at, but quite unfit for cricket, croquet, or even for walking on, some of these runners were so thick that they looked like flattened canes, so familiar to some boys, only with the joints much nearer to one another.

Some of our party for the first time set eyes on a living humming bird, of which there are, I believe, several species in the neighbourhood. From the small experience which I have had, they seem to be observed more frequently when sitting on a branch than when flying. When in the latter state, they resemble very closely the "Humming-bird Hawk moth" not uncommon in England. I have never heard of one being tamed, but they are by no means shy, and at Dr. Gunning's house about 50 miles out of Rio there was one which was certainly as tame as many robins are in England. It was very fond of resting on a creeper climbing up the Verandah and would only fly away when approached very near. I am told they go to the flowers for the insects inside rather than for the honey: of this I can form no opinion. The whole tribe of the Humming birds is so interesting from the brilliancy of their plumage, the variety of their beaks, tails and sizes, and even of the habits and the extremely local character of the species, that an ornithologist would revel in Brazil.

Whales not unfrequently enter the Bay of Bahia and are a source of profit to the inhabitants, but I could learn little or nothing about them.

And now, after a very hot, but nevertheless a very pleasant and interesting day, we started for our destination. This we were in hopes of reaching

on the morning of the third day, but a strong wind sprung up and in the night we were obliged to go considerably out to sea, to avoid the chance of encountering any rocks. This delayed us 12 hours and we never entered the bay of Rio till the evening, just as the darkness was closing in.

In all these tropical climates they have no twilight and the rapid transition from day to night is a great characteristic. When we came up on deck after a four o'clock dinner, we had just time to look around us as the sun disappeared behind the western clouds, before the whole horizon was veiled in darkness. The Bay of Rio is guarded at its very narrow entrance by two Islands Pai and Mai, the father and mother, and by a mountain, 1270 feet high, called from its shape, the Sugar-loaf. The latter was visible for many miles, and our excitement reached its height when we rushed up from dinner to have a near look at it as we entered the Bay. It seemed to be a perfectly barren rock, rising directly out of the water with rounded and perfectly smooth sides, so that the fact of its very seldom having been climbed is easily accounted for. The sides however are not so smooth as they seem for they are very plentifully covered with the prickly cactus, adding considerably to the difficulty of climbing. Some few have reached the top, chiefly English sailors. One party of sailors left the Union Jack flying on the top, at which the Brasilian officials expressed great disgust, and required them to remove it. The reply was that if they wanted it down, they must get it for themselves. The flag remained for some time, till at last the wind favoured the Brasilians and removed it for them. The Sugar loaf consists of granite, and like so much of the granite of the country decays and comes off in large flakes; on the side facing the sea a very large portion has fallen away, leaving an overhanging cliff at the top, adding considerably to the danger of climbing the mountain. The whole geological features of Brasil are extremely interesting, but require far more time than I could possibly have given to the study of them.

As we steamed down the narrow entrance into the Bay, we experienced the great swell that there always is there. The mouth of the Bay being open to the direct force of the Atlantic, the water comes in in huge swells, and though the stewards of the vessel are fully aware of this and take necessary precautions, yet on this occasion the vessel heeled over so much that we heard the crockery making a fair clatter, and some of our lady passengers really thought that we were going steadily to the bottom. This, however, did not last long, but so rapidly does darkness set in, that by the time we came in full view of the Bay, we could see but little. We comforted ourselves that we should see it all the better next day, for we found that we could not get ashore that night. Still we were repaid in one way, for not going ashore at once. The Brasilian parliament have made a contract with the only gas company to pay them so much for every public gas-lamp. The company have

Scale of Nautical Miles.
R. Iriri.
Piedade
S. Franc.co do Cruara
R. da Estrella
Porto de Mauá
R. Macacu.
I. da Pancrasibiba.
I. do Boqueirão
I. da Paqueta.
I. Brocoió.
R. Iguassú
R. Sarapuhy
I. do Tipiti
I. da Ilhoca.
I. do Nhanqueta.
R. da Engenhoca.
I. Conceição.
I. Bruce Forte.
R. Imbuassú.
I. do Governador.
I. d'Agoa.
I. das Taveras.
I. Fundão.
I. Secca.
I. do Engº
I. do Catalão.
I. da Villa
I. da Caqueirada
I. da Sapucaia
I. dos Ferreiros.
I. das Cobras.
Mocanguê.
NITHEROY.
RIO DE JANEIRO
Three Fathom B.
Palacio da Boa Vista.
Tijuca
Sugar Loaf.
I. do Pau Torto.
Lagoa de Taipu.
Tuchinos.
Mocuna.
Mai
Pay.
Cape Gavia.
Palmas.
Cagada.
Tijuca Is.
Comprida.
South Atlantic Ocean.
Rasa.
Redonda.
OF
J.E.H.

studied their own interests and have consequently put them as near together as possible and in every street or portion of street in which the most enlightened person can possibly imagine that a light is required. Rio is now a very large place, not only lining the Bay for some miles along the Western shore but also stretching up the mountains for some distance in land. On the Eastern shore opposite is also a "suburb" and this, too, is lighted with gas. The public road runs along the shore on both sides and is plentifully lighted, and consequently the sight from the vessel at night was extremely beautiful. A large Island, the Ilha do Governador, or Governor's Isle, is situated opposite the mouth of the Bay and intercepts the view in that direction. The lights from this form a kind of link between those of Rio and its suburb on the East of the Bay, and strangers therefore imagine that the whole Bay is surrounded with a string of gas-lights.

Having heard so much of the beauty of Rio Bay we anticipated a glorious sight the next morning, and though perhaps, at first, it was disappointing, it was a sight which grew upon one; so much has been written about it, that expectation is raised to the highest pitch and a different picture is formed of it, which a first glance dispels. But it is not by a single view that its beauties can be gathered. It is an enormous sheet of water, over 50 miles in circumference, and is not seen at a glance. There are numerous bays, each of them exquisitely beautiful and each growing upon one, the more it is visited. Towards the sea it is bounded by high mountains, the entrance being always indicated by the Sugar Loaf, the mountains are rounded and often clothed with trees to the top, except where sheer precipices present themselves. On the West side was seen the town stretching for miles inland and terminated by magnificent ranges of mountains. The one nearest to the Bay, the Corcovado, with its wonderful precipice near the top, so steep that it is possible to drop a stone for some hundreds of feet ere it encounters any obstacle. Beyond the Corcovado rise the Tijuca mountains, the highest of which far out-tops the Corcovado, at one side, and on the other the Gavia with its curious flat top; all these, high as they are, clothed to the very summits with green, and forming a lovely background to the town in front, which is situated as it were on a mass of hills, so that it presents a very pretty sight from the Bay. On the other side, towards the North, it spreads out into a sheet of water, the limits of which cannot be seen from the Bay, but which may be guessed by the undulating country beyond, and which is ultimately bounded in the distance by the Organ Range of mountains about 30 miles from the Bay. In fine weather these mountains form a beautiful object, but throughout my stay of 7 weeks in the country they were hardly ever visible, only once did I get from Rio a sight of the portion from which the range takes its name. This portion consists of a few very sharp peaks, and were considered like the pipes of an organ, by the

person who gave the name to the range. I have not met with any instrument or drawing of one to induce me to consider the name at all applicable.

Perhaps the finest view of the Bay is obtained from my Brother's house, situated some way up a high hill, almost directly in front of the entrance to the Harbour. Here you get a full view of all the mountains round, without that of the flat part of the Bay, the scene certainly improved and rendered lively by the shipping. Every vessel that enters or leaves is seen, and now that Rio has become so important a place with mails several times a month, its large trade and naval importance, there never is a time when the Bay looks dull, and there is constant interest from the large merchantmen, mail packets, and men of war which are incessantly visiting the town.

The Bay is studded with Islands, the largest being the Governor's Isle, mentioned above; another, the I. das Cobras is used for the Arsenal and Dock-yard. In this they have cut out a very fine dry Dock, finished most carefully, and a second one is being made, as the first is not long enough for the new Ocean steamers. A fine workshop is being built, and they have a large stock of enormous timber, from which I was able to get an idea of the size of the forest trees in the interior. The workmen are very fond of slinking off and going to a retired spot among this timber; here after having made themselves comfortable they light a fire and boil some coffee. The timber is not placed close together, so that long narrow channels are left between the logs, the draught carries the smoke down these channels and very soon informs the overseers that all are not at work; of course the delinquents are soon found out but they cannot understand how it is that with all their care they are so frequently detected. Naturally the overseers do not even hint how they know that they were not at work.

Another small Island is that where the mail Steamers take in coal; had the Company known what would happen, they would have bought the Island, but they let the opportunity pass, and now in addition to paying £1500 a year for the rent of the shed for their coals, they have to pay a milreis (about 2s. 3d.) on every ton of coals landed, and a milreis for every ton put on board. This tax adds largely to the cost of coals, and of course it is a matter of importance to save them as much as possible by using sails when practicable.

The only other island which I shall mention is that of Paqueta, situated quite in the Northern part of the Bay, and an extremely interesting one. The whole of the northern half of the bay is studded with boulders of all sizes, but until I went to Paqueta, I was unable to make any close examination of them. At a distance they look like rounded masses of limestone, and when I was told that Professor Agassiz conjectured that they had come by means of ice from the North of Europe I was very anxious to make their acquaintance. May I

here state that I have since obtained Professor Agassiz's Book, as also the one giving the "scientific result" of his journey, and I cannot find any mention of the North of Europe theory. But he does say that he believes the whole of Brasil to have been at one time covered with ice of very great thickness (ten or fifteen thousand feet). I am by no means prepared to assent to this statement, though when I allude to boulders found elsewhere, I may have occasion to refer to this theory again. I was surprised to find that these boulders were composed of an extremely coarse granite, but of a granite totally different from that on which Rio is built. I had observed however that the doorways and windows of the houses, (otherwise built of the common granite) were all surrounded with a very different kind, a specimen of which I was fortunate enough to secure. On taking these granites to the Museum of Practical Geology in Jermyn Street, the Officials, to whom my thanks are due for their exceedingly kind and courteous manner to me, tested them and informed me that, as far as the appearance and composition went, there was nothing to vitiate the theory that the two were composed of the same kind of granite. On my way to the steamer on my return to England I saw a cartload of this granite brought in, and my brother was able to get the actual quarry pointed out from which it was obtained, showing that there is some reason to suppose that these boulders may have come from a very near source. The boulders themselves are very interesting, their rounded appearance I cannot but consider to be due to weathering, for I was shown a boulder where the weathering had taken marked effect. Wherever there was a hollow indentation, so that water could settle, there the granite disintegrated, and I have in my possession a small handful of disintegrated granite which had come into that state during a few months. Mr. Cox, my informant, told me that he calculated that the boulders decreased about one-quarter of an inch every year. This will of course only refer to those where the disintegrating forces can have especial action, but I have no doubt in my own mind that the rounded appearance of the boulders in the bay is due to this process and that any marks of glacier action (supposing any to have ever existed, which I doubt) must have long ago disappeared. We passed in the steamboat one of these boulders which had been split in half, and another through which a hole had been made. One theory about these boulders was that they had been caused by some enormous fire, which had split up the granite and that then they must have been strewn about by some earthquake, in fact that there had been some Volcano near at hand. To this theory I cannot give my assent.

In the centre of the Island is a level spot called the "Campo." The surface of the "ground" is white with a few grass plants struggling for existence, such as we see on sands in England. This "ground" consists of a

course quartz sand, so pure that I thought it might be useful for glass-making, though I have since been told that *fine* sand is necessary for that purpose. This quartz seems to have been derived from the granite boulders, from which the other ingredients have been washed away. In our rambles we came upon blocks of granite, which had been apparently used for a wall, but so disintegrated that they crumbled almost at the slightest touch. A third form of disintegrated granite is one which is observed all over Brazil as far as I went, even at Bahia. It consists of a red clayey soil, which covers the whole surface of the ground and which in fact forms the soil in which the plants grow. In some places this soil before being disturbed is evidently decomposed granite, but in others it assumes the appearance of a very fine clay. In some places it is 20 or 30 feet thick. Professor Agassiz states that part at least of this clay is "drift-clay," the result of ancient glaciers, and it may generally be recognised by a band of quartz pebbles separating it from the decomposed granite below. Professor Capanema, who has studied the country, dissents from the glacier theory and believes that the clay is entirely the result of the decomposition of the granite, and to this I must confess that I incline.

The Bay of Rio, taking it as a whole, is not deep. The part used by shipping, and which is of very great size, is deep enough; but all the northern part is as a rule very shallow: round the Islands especially, you can go for 200 yards without getting much, if at all, out of your depth, and the bathing is consequently most delightful—for there is nothing to prevent a swimmer going as far as he likes, and yet non-swimmers can also enjoy bathing without any fear of getting out of their depth. There is one thing, however, which must be guarded against, and that is the *oysters*. The rocks are covered with a small species of oyster, the edges of the shells being remarkably sharp. If, therefore, one's foot or hand comes in contact with them, it is very seriously cut; but it is very easy to avoid these rocks, and as the oysters do not run after you, there *ought* to be no damage to bathers.

The mention of oysters leads me to say a few words on the *shells* of the bay. On looking at a chart, you will see regular districts with mud, sand, or shells mentioned as being at the bottom. I was not able to study the Conchology, but as they dredge up these shells for the purpose of burning them for lime, I examined the heaps as far as my nose and the mud would allow me. Oyster shells (some very large) form the principal portion of the heaps, but *cardiums*, mussels, and a kind of whelk are not uncommon. Since the time that building was first started the lime used for the mortar has been procured from these shells. Eight parts of shells and one of fine coal dust are mixed together and then burnt in kilns, the result being a very fine white lime. The kilns are situated in buildings and the fire fanned by machinery making a

drumming noise like our thrashing machine and by no means pleasant to those living near.

Shortly after landing on the island we saw a pile of midribs of the cocoa-nut palm leaves, not such insignificant things as the midribs of even our very largest leaves would be, but good strong "sticks" 12 or 14 feet long. These are used for "fishing nets." They are tied together side by side, in the same manner as reeds are tied together to form blinds, and then put down endwise into the water, and supported at regular intervals by strong stakes. After being carried out some distance from the shore this "hedge" of midribs is turned round almost in a circle, leaving an opening for the fish to enter, the whole forming a frame something like a J with the lower part curled more round, the fish are guided by this arrangement into the circular part at the top, where they are caught at regular times.

Small as the Island is, it is astonishing what a variety of plants grow on it. The first I shall mention is the Mangrove, a tree which I had long wanted to see, but of which I saw only a few young shrubby plants. At the northern end of the bay is a large Mangrove swamp 30 miles long and 20 broad, and from this came large quantities of young Mangroves. The tree itself grows out of the water, sending out numerous roots which perch the trunk above the surface of the water. The seeds begin to germinate ere they have fallen from the tree, and seem to live well even when in the salt water. The young plants, consisting of two large fleshy cotyledons and a radicle about an inch long, thickly covered with hairs, were plentiful on the shore. The hairs have the power of catching in the irregularities on any object they encounter, and I found some of these young mangroves already taking root to the rocks under the water. I was told that in the mangrove swamp oysters are frequently attached to the roots. The Indigo plant, a shrub of the pea-flower tribe, with small pink flowers, was occasionally met with. This plant appears common in Brasil, though nowhere cultivated as far I could learn. Of course the Mango, with its branches coverd with parasitic plants, especially some *Tillandsias*, one, called the "old man's beard," resembling at a distance the lichen which also bears the same name in England, and is common in the woods of Westmoreland and the north, and *Bromelias*, with a bunch of prickly leaves like those of the pine apple (whence their name of wild pines), but with a raceme of scarlet, or scarlet and yellow flowers. There were numbers of other kinds of plants, of which I had never even dreamt, and of which I knew not the names; one, however, which seemed to be a kind of myrtle, had curious large red berries, pleasing to the taste of some people, but of too turpentiney a taste to please me.

I shall only mention one other plant now, the cocoa nut, as it was here more especially that I could examine it closely. This

plant does not bear fruit till about seven years old, and is a very slow-growing tree, some of which were eight or ten years old not being above seven or eight feet high in the stem, though the enormous pinnated leaves made it look much taller. The stalks of these leaves are flattened out at the base where they join the stem, and are also furnished with a network of strong fibres binding them as it were to the trunk. This network is a wonderful provision of nature for enabling the leaf to remain attached to the plant, for unless some such provision were supplied, it would be impossible for the enormously long leaf to support itself on the stem. The cocoa nut is easily recognised by its crooked stem—all other palms, as far as I have seen, having (except under peculiar circumstances) perfectly straight stems. In the case of the cocoa nut it seems as if the young plant had been thrown considerably to one side and then grown up straight. The nuts are produced in bunches. The plant sends out generally a bunch of barren flowers and a bunch of fertile ones, and of the latter from twelve to twenty come to perfection, though several smaller ones are produced. The stalks of these bunches both of barren and fertile flowers would form excellent "birches," and one would last a long time, as the fibres are very strong, and would evidently stand a good deal of wear. The cocoa nuts are often eaten when young and full of milk, and is said to be excellent in the early morning when properly cool. The one I tasted was not nice, probably from trying it at about four o'clock in the afternoon. Four or five crops of nuts are produced yearly, so that it is a very important tree with the natives.

Of seaweeds I saw but few, but I fancy that there must be some very beautiful ones. For the first time I saw the *Peacock's tail* (*Padina pavonia*) growing in profusion on a rock. It is however not uncommon in England.

The name Paqueta is the original name, and it is a curious fact that these inhabitants who have the old Indian names are very proud of them, as showing the antiquity of their families. The Portuguese are honorably noted for the manner in which they became possessed of the country—not as with the Spaniards, but by peaceful immigration. The original inhabitants have been *shoved* away, as it were, by civilisation. The Indians lived happily enough beside the Portuguese, but finding their hunting and fishing grounds not so profitable as formerly, *they* moved off, leaving the Portuguese in full possession of the land. It seems as if a similar fate will overtake the Brazilians, now that slavery is doomed. Unless they become more energetic (of which there is little chance) they will not be able to compete with foreigners. As it is, every thing they take in hand seems to deteriorate. They think that *tomorrow* will be quite time enough to repair a road or do what is necessary, and it is easy to foretell the result. This is, however, a digression.

There is a tide in the Bay of Rio, but not of any great height, about one foot or so I think, but it is very uncertain and dependent on the state of the weather outside. A few rivers of very small dimensions run into the Bay, but they would not cause any perceptible difference in the height of the water. The mouth of the Bay is very narrow, and hence when the winds blow off shore, it would prevent the entrance of water into the Bay, if blowing towards the mouth, it might cause an extra high tide. For these reasons the subject of tides in the Bay is not a very intelligible one.

Storms, too, are not uncommon at times; but they are much influenced by the surrounding mountains, so that they may be all round without being actually over head. As with all inland lakes squalls are not unfrequent, and sometimes very sudden, rendering it dangerous to be out in small boats. I experienced one of these squalls. We had been dining with the Captain of a Man of war (the Pylades), who kindly asked us to inspect his ship. Scarcely had we finished dinner when so strong a gale sprang up that we *could* not leave the vessel. It was not till about an hour afterwards that the wind lulled sufficiently to enable us to get on shore, but even then it required the efforts of 12 men at the oars to do so.

Of the numerous smaller bays which surround the large Bay, I may mention two, that of Botafogo and Jurajuba. The former is really what may be called the "West end" of Rio, surrounded on the north and west sides by the villas of the wealthier people, and on the south side are the two large buildings of the Naval School and Lunatic asylum. From the Bay it looks very fine, as it is backed by the wooded heights of the Corcovado, Gavia, &c., but I could not bestow all the praises usually lavished upon it. The other Bay, that of the Jurajuba, is very picturesque, studded near the shore with curious rocks, clothed with plants. A view of this was given in one of the numbers of the *Graphic* for November or December.

The town of Rio de Janeiro itself is very large. Including all the scattered houses in the outskirts, it measures seven miles from one extremity to the other. But to those who have seen the palaces of the Regent Circus, Trafalgar Square, and the West end of London, the houses of Rio will seem eminently unworthy of the capital of a great Empire. So far are the houses from being imposing, that the majority of them are only one story, a typical Brazilian house consisting only of a ground floor raised six or eight feet above the ground. In the old part of the town the houses are kept in countenance by the streets, which are as narrow, or narrower than those of a small English town, so narrow indeed that two carts cannot pass without going on to the pathway, and as this, though paved with large flags, is not raised above the roadway, it requires a sharp look out when walking along to avoid the wheels of the vehicles, and I have frequently had to get on to a door

step to avoid having my toes squashed. The reason given for these narrow streets is that there may be always one side at least in the shade; at mid-day however when the sun is overhead, the rays seem concentrated as it were between the two rows of houses, and even the Brazilians, inured as they are to a tropical temperature, shrink from walking out at noon. Hence it is a popular proverb in Rio Janeiro that the only living creatures seen abroad at mid-day are dogs and Englishmen.

It is but of late years that any attention has been paid to the paving, as the Brazilians have only recently learnt the art of working the granite. Hence though the town stands on a granite easily worked and now extensively used for building, the first street in Rio that was honoured with a pavement (the Rua Direitta) was paved with granite dressed in Scotland. Like all the old continental towns they have adopted the plan of placing the gutter in the centre of the roadway and making the sides of the road slope towards the middle, after tropical rains, therefore, the street becomes a sheet of water and the niggers derive a harvest by carrying people over the places where the side streets run into the principal ones.

A vast improvement has taken place since tramways have been started, not only are the wretched omnibuses in a great measure removed, but much of the cruelty to the mules is prevented. Mules are found to be the only animals which can stand the climate, and these animals certainly have a will of their own. The whole process of "breaking them in" takes but a very few hours, during which the whip is freely used, and for long afterwards the starting of an omnibus with these animals is an exciting moment. Should there be leaders, they are obliged to be turned with their head *towards* the wheelers till the latter are properly fastened in: they are then turned round, the traces rapidly secured by the attendants and the man at the head steps nimbly aside, when a grand display takes place for a few moments and then off they go as fast as they can. Formerly the whip was freely used, but as soon as the tramways were started a notice was put up that a higher rate of pay would be given to those drivers who were sufficiently expert to drive without the use of a whip, when it suddenly became a rarity to see a whip at all. These tramways are wonderfully "paying" affairs, for no one dreams of walking such an enormous distance as half a mile, and consequently they are generally crowded, even the steps having as many as they will hold.

It is amusing to see how every possible method is adopted to save exertion, and I do not think I shall be saying too much if I venture on the assertion that all the virtues and all the vices of the Brazilians may be summed up in the single word "laziness." To such an extent is this vice indulged in that they have even become too lazy to knock at a door when they wish to enter

a house. The only exertion which they will permit themselves in order to attract the attention of those within is to clap their hands. The sellers of tin go about with a clank of two of their articles to give notice of their approach, and those who sell millinery the crack produced by the pieces of their yard measure. The only men whose voices can be heard in the streets are the blacks. They say that it helps them in their work. But do not suppose that they indulge in the negro melodies with which we have become familiar through the Christy Minstrels. As they carry their load down the street you may hear them repeating in an endless monotone presumably some "tune" from their native land, or if they venture so far as words, one carries a tin affair, something like the rose of a watering pot filled with stones, which he keeps on incessantly shaking, whilst the rest of the party keep on repeating some such phrase as "there goes a man, there goes a man, there goes a man," and when weary of this they may change it to "he's got a hat, he's got a hat, he's got a hat," till at last the sounds die away upon the agonised ear as they turn some corner.

This excessive laziness accords well with the system of rampant red-tapeism of the Government. Nothing can be done in the town without an order from Government. Let me give two instances. On one occasion, the sea wall on the shore of the bay was broken through and the roadway seriously injured, and the injury kept on daily increasing until at the end of a year the roadway was entirely washed away at that part and the garden wall opposite was also fast coming down. But the Brazilians are utterly helpless. The government officers had taken no action in the matter and they dared do nothing independently. Again, the water supply, though much better than it was a few years ago (when as much as £6 had to be paid by a private house for its water supply for a fortnight) is still not perfect, and of course it is important that the water should be husbanded during the winter to supply the demand in summer. The water is mainly supplied by an aqueduct conducting it from the Corcovado and neighbouring heights, but wherever they can get a spring nearer, the water is conducted to the street and each one helps himself by merely turning a tap. The pipe conducting the water to one of these taps, situated some way up a hill, and on which the neighbouring houses mainly depended for their water supply, burst one day and there the water was running for two or three days in a splendid stream, washing away the road-way at the same time. A gentleman offered a man over a sovereign if he would just do something to prevent the waste of water; but no—the order had not come from government and nothing could be done. The water was running for days ere the leak was stopped and even then the same scene was enacted ere the pipe was properly mended.

The shops in Rio are very expensive. It is scarcely possible to purchase anything at a lower price than two shillings, and the shopkeepers have the abominable French plan of always asking for more than they mean to take. English apples at a street stall cost 1s. each, butter (fresh) 5s. 3d. per lb., photographs, especially, are costly, a *carte de visite* of the Emperor costing 2s. 3d., and larger sizes in proportion. This probably results from the *milreis* being the standard money, and from the fact of there being no manufactures peculiar to the place. People generally purchase feather flowers, or insects set in gold to bring home to their friends in England, and as they do not mind spending a good deal for once in their life, they pay anything that is asked. The only things really made in the country are feather fans and feather flowers, and these, I believe, are now often made in Europe and imported. For those who wish to bring home reminiscences to their friends, I should recommend them purchasing beetles or humming birds (at Bahia if possible), and having them mounted in England.

The only cheap article is meat, but even this is so scraggy and lean that it is really not as cheap as one would imagine. Sixpence a lb is the price, but unless the very primest joints are obtained it is full of sinews, and the animals are so queerly cut up that the waste must be enormous.

The blacks live principally on *fagean*, a compound of black beans and very fat pork, with *carne secco* added to suit the palate. This *carne secco* is horrible looking stuff, and forms one of the adornments of almost every shop. It is merely dried beef. The whole flesh of the animal is cut off the bones in one large sheet and then dried. No doubt it is very wholesome, but it is certainly not a tempting dish. This *fagean* is really not bad, and is immensely liked by some people, and is said to be very cheap, though not so cheap now as formerly. A man can eat as much as he likes for twopence. It is for this reason that starvation is absolutely unknown, and when we consider the quantity of fruit, the poorer classes may almost be said to live better than the higher ones. Of all fruits perhaps the Banana (or Plantain) is the most important. This plant consists of a stem eight or ten feet high, terminated by a bunch of large leaves, which, however, are soon torn to shreds by the wind. At the proper time a bud like a red cabbage springs out from the midst of these leaves and rapidly lengthens out; under each of the leaves of this bud are about eight flowers, and as the bud lengthens these leaves keep on falling off as soon as the fruit has "set," and thus for every leaf there are about eight bananas. After about twenty leaves have fallen off, the plant seems to have no power to support any more fruit and consequently flowers and leaves fall off together. The stalk of the bud still continues to grow, and you see the mass of bananas close to the stem and a long stalk terminated by this red "cabbage." As soon as ever this falls, it is time to cut off the whole

mass of fruit. The people do not take the trouble to cut off the fruit, but cut down the whole stem, and in its place five or six more stems come up. It seems the Banana has more vitality than most plants, and even the stem which has been cut off not unfrequently sends out shoots—at least so I have been told.

But to return to Rio—the public buildings may be very briefly disposed of, for there are none worth looking at externally. The most interesting building is the Museum. In it, I saw the only Brazilian gold coins which I came across during the whole of my stay. The collection illustrative of Ethnology was very interesting, small for the extensive range of the subject, but what they had was good, and the collection of native weapons, &c., was really extensive. The minerals require more expansion and description, but the collection of animals was curious, many of them are abominably stuffed, the poor lion seemed to have nothing whatever inside it, or might appear to an ardent imagination to have wasted away with unrequited love. The birds of Paradise seemed to have lived in Alice's land, through the looking glass: at least they were all "stuffed" with their heads topsy turvy. But though I must thus condemn the actual specimens, the arrangement was very good, and signs were evident that a vastly improved set of specimens will ultimately take the place of those now there. I must not omit to mention a most magnificent work on the orchids of Brazil, not yet published, though the manuscript and plates are shown to any who wish to see them, nor must I omit to mention a rather extensive collection of monstrosities, most of which, however, would be far better in an anatomical Museum. Opposite the Museum is the mint, in which, I believe, is a fine set of machinery; but for all practical purposes the building might equally serve as a jail, for they have no idea how to use the machinery in it. I have before alluded to the currency and how tramway tickets take the place of the smaller sums.

The Misericordia Hospital is a place well worth seeing. It is very large and admirably kept, even the medicines dispensed by sisters of Charity. Everything is scrupulously clean and all the beds capable of being furnished with musquito curtains. It is kept up by a toll levied upon every ship that enters the bay, and also upon the hearses. These latter can only be procured from one establishment and half the cost of hiring a hearse has to go to the Misericordia Hospital. These hearses are not at all similar to those used in England, the coffin is quite exposed to view, and sheltered by a canopy supported on four pillars. The first-class hearses are one blaze of gold, and the coffin covered with broad gold lace. The whole funeral arrangements are necessarily very hurried, as the body is not allowed to be in the house more than 24 hours after death, and in most cases the funeral is over by that time. As soon as a person dies, notice is sent to the daily paper with the time fixed

for the funeral. At the time stated the friends either assemble at the house or at the cemetery and though little or no colour is visible in the dresses of the visitors, all have evidently come direct from business. In this way as many as 100 or 150 will often attend the funeral of some well-known merchant.

The churches are of course sufficiently distinct, but few of them have any pretensions to architecture. The largest, that of the Candelaria, was being entirely renewed inside; but a fine view was obtained from the top. The church of Francisco de Paulo is very gorgeous inside and perhaps the one most worth seeing. The church on the hill of St. Antonio is very old, (over 200 years I think) and in a wonderful state of preservation, but as a rule the churches are not interesting. An extraordinary use to which they put them does not show any very strong religious feeling; all elections are held in the churches, and when these are going on a guard of soldiers is always present to keep order.

Of course I must mention the English Church: externally it looks like a dissenting chapel, as it is forbidden to make it at all like a church outside. It was formerly uncomfortably fitted up, but of late years it has been amazingly improved and the arrangements admit of as much coolness as possible. Even here, as in all private rooms, earthenware water bottles with glasses at the side are placed for the use of the congregation.

But I must hasten on. In Rio there are not many squares or public places. That of the Place de Constitucao or Constitution Square is finished and has a very fine statue of Pedro I in Bronze surrounded with groups of native men and animals, forming a remarkably fine ornament to the city. The Campo Santa Anna is intended to be a very fine square, at present it is principally used by washer-women. The public gardens, different from the Botanical Gardens, are small but very pretty. The arrangement is such that it appears to be much larger inside than it really is, and at one side is a fine terrace overlooking the Bay.

The Emperor's Palace is situated some little distance outside the town. It is an imposing building when seen from a distance and will ultimately be surrounded with fine gardens, which are at present in course of formation. There is, however, an avenue of Bamboos which is well worth mention. Though there are several native Bamboos, they use principally the East Indian, which has been introduced and grows vigorously. It grows in large clumps with the stems running up to a height of 40 or 50 feet. The long avenue of those in the Palace Gardens forms a most exquisitely beautiful walk.

Of course I went to the Botanical Gardens, but though a place of frequent resort, so much so that the tramway has been brought past the gates, I was surprised at the long distance from the town at which they are situated. The gardens themselves form a very beautiful "public garden," but for Botanical

purposes are useless. Instead of having even a collection of Brasilian plants, it is marvellous how very few there are really in the place open to the public. By the aid of introductions kindly furnished by Dr. Hooker, I was enabled to see the private part, and though there are certainly more plants here, yet they are all in confusion, and without any attempts at being named. Botanically speaking, therefore, I was greatly disappointed, but yet the gardens are well worth several visits. The great glory of the gardens, for which they are unique, is a most magnificent avenue of palms. The particular species of which it is composed, the *Oreodoxa orellana*, is peculiarly well suited for the purpose. Rising from an enlarged base, something like a bulb, springs a tall perfectly straight stem about 120 feet high, gradually tapering to the top. The upper 20 feet of this is green (the lower part grey) composed of the leaf-stalks of the long pinnated leaves which spring from the top and arching over making the whole look like the aisle of a church and is wonderfully impressive. So tall are these trees that the enormous size of the leaves is lost, but it is not difficult to find one that has fallen off, and I took the opportunity of measuring it roughly, it was about 40 feet long. Of course if one were to fall on a passer by it would seriously injure him, and that is the only thing (but certainly an important one) which can be said against an avenue of these trees. In addition to the long central avenue (about 50 on each side) is a transverse one near the gateway; on entering therefore the visitor is enchanted with the magnificent sight and as he then faces the wooded heights of the Corcovado, which rise up within a short distance beyond the gardens, the scene is wonderfully grand. Yet to look down *upon* them from the top of the Corcovado, they are quite lost and do not at all add to the beauty of the scenery when thus seen from a distance. Tall as these trees are, they are only 27 years old and even now some have died and their places taken by younger specimens. In addition to this avenue of palms there are one or two smaller avenues of other trees, but as for flower beds there are really none to speak of, and not even could I find a collection of Orchids, about as lovely a sight when in flower, as could well be imagined.

And now I must turn from Rio to the surrounding country, as I fear I have already wearied out your patience. It had often been a surprise to me, when looking at a map of Brasil, to see nothing but hills marked and no names given to the various ranges. This I can easily understand now. The whole country is one vast mass of mountain ranges, for though not snow-capped and all covered to the summits with vegetation they are far too high to be called hills. Wherever you can get an extended view of the country, it is possible to count at least four ranges. For this reason the country to me was always a beautiful sight. Yet it is not so to all, there is a distinct absence of water, and the scene has been described to me as so closed in that "one would like to push

through them and so get views of the sea." I cannot say that Brazil is dry, (my Botanical paper was always a trouble to me for it took a deal of time and patience to get it sufficiently dry to use a second time, and I found drying flowers a most profitless employment, as they so frequently turned black), yet there are not the large rivers which add so much to European scenery; such streams as there are, are so closed in with trees and bushes that you cannot see them. The river Parahyba is an exception, a fine broad river running in a broadish valley: it is however unfit for navigation as it has such countless shoals and rocks that the boats must be very shallow and very skilfully guided. What little attempts there were for using the river for mercantile purposes have been rendered abortive by the construction of a railway.

I said these hills and mountains were covered with trees to their very summits. There are two classes of exception to this, and which I must say in all accessible parts occasionally make a great difference in the view: one is the precipices. It is wonderful to see the sheer steep precipices, many hundred feet high, which are not unfrequently met with. They are exceedingly grand and about Petropolis, where the Organ mountains surround you, they add much to the scenery, but they are not bare of vegetation. Some of them are studded all over with the "wild pines" (*Bromelias*), which I have already attempted to describe, not unfrequently also a fine clump of orchids is visible, perfectly safe from the destructive approach of man, for so much have these plants been sought after of late years that in some places near Rio, even the very commonest are scarce. The second exception is the old coffee plantations. A person, when wishing to start a coffee plantation, buys many square miles of land, selects the greenest part of the virgin forest, burns it down and plants his coffee. No trouble is taken to manure the land or to *keep* the plants in good condition, consequently after a certain number of years the coffee plants get "worn out" and the soil exhausted. Instead of manuring the land, the owner removes his plantation to another spot and these coffee bushes gradually die away. Now that this plant has been in cultivation long enough for the land to have been exhausted, you may go for miles along the good roads and see around you either bare hills or scraggy coffee bushes; and this, though your eye can always rest upon a more glorious sight in the distance, *does* at times considerably detract from the pleasure of the view.

I mentioned the Virgin Forest just now. Though, no doubt, in the more central part of Brazil, some hundreds of miles up the country, it would be possible to find a scene such as that described by Kingsley in his account of the West Indies, yet I was sadly disappointed when I came in actual sight of what I was told was "virgin forest." Instead of the noble trees towering overhead as I had expected, my eye rested upon what I should call a rather tall hazel copse (extending of course for miles in all directions), but without

the fine trees which can be seen even in Manton Copse. Trees do indeed tower above the general bushes, but they are generally very tall and thin with a head of spreading branches near the top. The "copse" itself is dense enough and utterly impassable without a hatchet, but there is nothing to induce one to make the attempt to wade through it. Not only have all the large trees within easy reach of the road been cut down (the pathways to and from them being speedily obliterated by the rank vegetation), but a curious consequence of the destruction of *some* of them is that the remainder die off of themselves. The only theory which was given to account for this remarkable phenomenon was as follows. These trees are inhabited, each of them, by a certain number of insects. As soon as one is cut down, its inmates betake themselves to another. The more numerous, therefore, the fellings are, the more of these insects there are to be disposed of among the remaining trees. Preyed upon by such unusual numbers, the surviving trees prove unequal to the task and succumb. How far this theory may be correct, I shall not pretend to determine, but in confirmation of it I may mention that one tree was pointed out to me which only the year before had been a most magnificent specimen, but which when I saw it was utterly dead and fast going to decay, having been destroyed in this short time by a large colony of beetles, the larvæ of which smelt like honey. Another reason why, perhaps, the trees do not grow to such an enormous size, is the extraordinary vegetation with which they are clothed, not only do creepers of all kinds clothe the trunks and hang down in festoons, but stems and branches are covered with *tillandsias*, *bromelias*, *orchids* and other plants commonly called *parasites*, not a botanically correct name however, though called so by every one, for they do not grow *into* the trees as the misseltoe with us, but merely *on* the tree, till after a time they stifle the growth and the tree dies. A single tree is frequently deserving of a month's study, especially if it has recently fallen. The wonderful amount and beauty of the plants which clothe it is surprising and can hardly be imagined by those who have not actually seen it. With all this incessant decay of wood and vegetation, there is scarcely any vegetable soil. The heavy rains wash away whatever might have been spared from the ravages of the insects, hence the red decomposed granite forms the main soil of Brasil.

One of the most common trees which catch the eye when looking at a piece of virgin forest is the Sloth Tree (*Cecropia*). I met with three kinds, all with very slender stems, nearly straight and of a wonderful uniformity of size all the way up, with about six slender branches spreading out at the top, each branch terminated with a small tuft of rather large, stalked, leaves, more or less deeply divided into lobes. They are all whiter below than above, but the species which most attracts the attention has the under-side of the leaves clothed with a very dense, pure white down, so that with every breath

of wind these white under-sides flash on the sight. The stem is perfectly hollow when old, though when young it is divided, especially near the top, into partitions. The sloth is very partial to these trees (whence their name) and when young the stems are generally tenanted by ants, which bore a small entrance near the top; the sloth lives upon the leaves, some persons saying that the ants form a part of their food, but this I should doubt. Like many of the trees of Brazil, they have a very copious milky juice, which stains linen or pocket handkerchiefs, as I learnt from experience. The hollow stems form excellent water pipes, either split or whole, and many are the little streams conducted to the houses by means of these stems, which are just narrow enough at an end to fit well into the next in order.

Some species of trees, especially of the fig tribe, grow to a great height from the ground without sending forth a single branch. The large mass of branches and foliage would break down the tree were the trunk not supported by a special provision of nature. From the trunk project several large narrow projections, forming perfect buttresses, if I may so term them—not such insignificant things as might be supposed, but as much as 20 feet in height and length. In some cases these buttresses are thatched over by the natives, and thus form perfect impromptu habitations; a large family being able to live in the most perfect comfort under the shelter of a single tree.

The timber of almost all the Brazilian trees is excessively hard, and consequently very durable for buildings; so hard is it that it is impossible to use a plane for smoothing it; but the carpenters have to employ an adze to level such floors as are made of it, and they do it with such skill that it requires a close inspection to see that the floor has not been planed. In many cases the doors and windows are imported ready made from the United States. The stems of some few species are prickly, especially some of the palms; but one species the *Silk Pina*, planted as an ornamental tree, is clothed from the very bottom of the trunk to the ends of the branches with one dense mass of prickles. Happy are the birds which select this tree for nesting purposes, for I defy any boy to swarm two feet up the trunk of one of them. But one could go on for ever talking of the marvels of the vegetable world and must end somewhere. I will therefore limit myself to an account of but one more tree ere alluding to the ferns and the flowers, of which I must say a few words. The tree I refer to is the Sapucaia-nut Tree, or in more familiar language the "Monkey Pot," from the following circumstance, of which I have read the account, though I cannot vouch for its truth from actual experience. Most of you have no doubt seen the capsules in which the Brazil-nuts grow, and which are so hard that it requires the teeth of a rodent or the slow process of decay to release the contained nuts—but these Sapucaia nuts grow in a capsule with a lid, which

falls off as soon as the fruit is ripe. The capsule itself is about the size of a very large cocoa-nut, and the nuts inside are peculiarly grateful to the palates of the monkeys. As soon, then, as the lid falls off a hole is left sufficiently large to admit the animal's paw. But when he has clutched as many nuts as he can possibly hold, an unexpected difficulty presents itself. The hole which was sufficiently wide to admit the entrance of the hand when empty is too narrow to admit of the exit of the hand when full. It never occurs to him to open his hand and drop the nuts, and thus these creatures can be easily captured by those who set the capsules as traps for them—but as they have never been found dead, it is presumed that exhaustion may cause them to drop the nuts and thus allow their hand to be withdrawn.

Brasil is a regular home of ferns, and among other commissions I had received, was to procure some Tree Ferns. Those near Rio are scarce, especially small-sized ones. At Tijuca they seemed plentiful, but my time there was limited and it was pouring with rain during nearly the whole of my visit. But in the neighbourhood of Petropolis, in the Organ range, they were exquisite. A first view of a tree fern is something to be remembered. There they were in perfection. At the Falls of Itamarity, a few miles from Petropolis, was a valley almost filled with them. Their stems are very thin, not six inches across, and sometimes 30 or 40 feet high, terminated by a tuft of most delicate fronds, often over 12 or 14 feet long, and forming lovely objects. In this forest of them to which I allude, there were not only these tall graceful ferns, but wherever one was broken off the portion of the stem still erect was clothed from top to bottom with most delicate "filmy" and other ferns, and scattered about among them were numbers of other species with shorter and thicker stems (called sub-arborescent). Another class of ferns runs along the ground or climbs up trees. The stem is clothed with scales like the "Hare's-foot Fern" and creeps up a tree, or over a stone, sending up at intervals a frond, so that a single plant may clothe a stump with verdure. The Maiden's-hair ferns were also plentiful in species and specimens. The *Adiantum cuneatum* is especially common and the walls by the roadsides are perfectly clothed with them. Nowhere, perhaps, did I see a more marvellous growth of ferns then under the arches of the aqueduct leading from the Corcovado to the city. For some distance the arches are very low, requiring a person to stoop down to see them, but then the sight is worth any amount of trouble, *each* archway would drive any fern cultivator frantic, clothed on all sides with such a variety of most graceful ferns. I must not omit to mention one species at Petropolis, creeping over the rocks and sending down fronds, some of which I measured, and found not less than 12 feet long.

From the density of the vegetation, it is not to be expected that there would be many *herbaceous* plants, such as clothe our roadsides, but yet I was

surprised at the number I met with, and I was very anxious to find how many of our British Plants grew wild in Brazil. I have already mentioned the Sow Thistle (*Sonchus oleraceus*), to this I must add the chickweed (*Stellaria media*), but rare, the mouse-ear (*Cerastium triviale*), the watercress (*Nasturtium officinale*) common enough to be eaten as in England, and a variety of the common Bracken (*Pteris aquilina*). All of these are among our commonest plants and it may be imagined that they had been introduced, but I am inclined to think not. In the high and cooler Petropolis, I found the common Poa grass (*Poa annua*) Petty Spurge (*Euphorbia Peplus*), Spurrey (*Sperguls*) and Blue Pimpernel (*Anagallis coerulea*), besides one or two more doubtful ones. None of these are showy plants and I can easily imagine that to one who did not look for them, these kinds of plants would be unnoticed. But if the humbler plants are scarce, it is well compensated by the shrubs. They must be something magnificent when in flower, one very common shrub, the *Quaresma*, with its bunches of exquisite mauve flowers, being as beautiful a plant as I ever saw. About Petropolis I was struck with what appeared to be white roses lining the roadsides. A closer inspection showed that they were double raspberries, single flowers of which I had seen at Palmeiras, when staying with Dr. Gunning, whose kindness and hospitality are unbounded and to whom I owe many thanks for an exceedingly pleasant visit to his little colony. The Brasilian raspberry (*Rubus rosæfolius?*) is very nicely flavoured both fresh and when made into a preserve, but of a more acid taste than what our English ones have. Mixed with these double raspberries were bushes of the very small "Scotch" rose, but this latter is certainly not indigenous to Brasil.

The "Fortune plant" with exceedingly juicy leaves is very curious and interesting. If the leaves are pinned up against the wall, they send out a series of little shoots, each with its bunch of roots. Its name is so called because "if you have these leaves in your house, you will never want for money." I had some in my Cabin, which sprouted famously, I can only hope that those friends amongst whom I distributed them in England may find the saying true.

I shall finish my notices of the plants of Brasil with a short account of the Aloe. The plant itself is well-known in England, its thick sharp-pointed leaves are seen in many gardens, and it is said to flower "once in a hundred years," the fact really being that it will very rarely indeed flower in our climate. In Brasil it flowers when about ten years old, but this very flowering is the sign of its death. The stem of the Aloe is about two or three feet high, but when the plant flowers this stem lengthens out enormously, often as much as 40 feet, with numerous spreading branches. From these branches hang the flowers, rather small and creamy white, but I am inclined to fancy that though these flowering shoots are common enough the plant rarely has *flowers*, but a kind of *bud* instead, just as our "viviparous" grasses produce buds of leaves, capable of

producing fresh plants. I was unable to examine them as much as I should have liked, but certainly though I saw many of the flowering stems the only *flowers* I saw were some which had been produced on stems which had been cut or broken off and then only in small quantity. The stems are used by Entomologists instead of cork, being exceedingly light, but the pins must be pushed in some way for security, and thus they are unsuited for English pins. The dried stems go by the name of *Peter*.

I feel that this paper has already extended to too great a length, and there are many subjects on which I should like to say a few words—but I must not go on much longer. I shall therefore say a few words upon what observations I could make on the animal life of Brazil.

Of the *birds*, I have already alluded to the Humming birds; the only other species at all common and then only seen where a dead animal is to be consumed is a small species of vulture called then the Urubu. At the Matadoro, where all the animals for the city are slaughtered, they may be seen in abundance, but the whole place is so horribly nasty, that few people care to be near it longer than necessary. It adjoins the railway and is situated between the Emperor's Palace and the city, so that whenever he visits his capital, he is sure to know where it is and I cannot help thinking that when the wind is in the right direction, he must be unpleasantly reminded of it, even in his palace. There is another kind of vulture (I believe) which I heard in the forests, making a sound like a hammer on an instrument used for boring rocks. The dense vegetation prevents any possibility of much in the way of birds or quadrupeds. Of the latter I saw no wild specimens at all. A species of Armadillo is occasionally found, but is very rare, also the Macacus monkey, in fact a place is so named from the moakeys which used to be common there, but all have been caught or driven away. The Sloth is now only to be found some miles away from Rio and so are almost all the other native quadrupeds. I have mentioned the mules, but I cannot help alluding here to the markings observable on the legs of some individuals. Dr. Darwin mentions instances of Zebra-like markings appearing on the legs and shoulders of horses; in Rio I twice observed six or eight transverse stripes on the legs of mules, but when I went to Petropolis and saw the mules used for the public coaches, I observed sometimes all of a team of five so marked, certainly one at least in every team was marked in this way. I should have liked to have investigated the ancestry of these mules.

Dogs and Cats are very common, but in general very miserable creatures. Many of them are tail-less; not because they have descended from the Manx cats and dogs, but because when young they are very subject to a kind of fit, which drives them mad with pain and soon kills them, unless they are bled in some way, the readiest method being that of cutting their tails or ears. The dogs are a fearful nuisance, barking all night long, and as each house

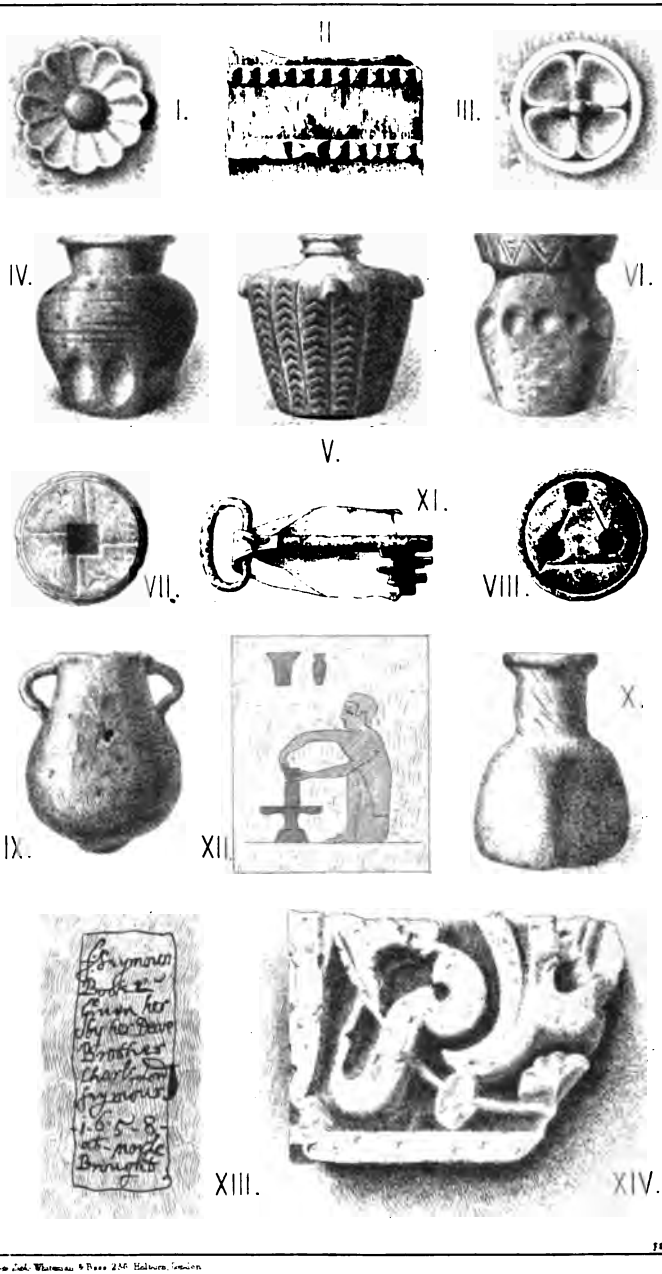
keeps at least one (often two or three), the chorus at night is anything but conducive to sleep. In the hot weather the police are supplied with poison balls and any dog found straying is favoured with one of them: were it not for this the place would be over-run with them.

Snakes *used* to be abundant, I believe. My brother, during the eight years he has been in the country, collected all he could for me, and Dr. Gunning gave him several. I have now a very fine collection but unfortunately not named at present. They range from a small whip-cord like animal to some six or eight feet in length: most of them are poisonous, and some exceedingly so; the coral snake, so-called from its bands of coral red, is especially dangerous.

Lizards are abundant both in species and numbers. It was very curious to see how they crowded on the glass of the gas-lamps, after the insects, I presume; though some imagine it is for the warmth. It certainly is remarkable how they found out these spots, whether for warmth or food, and shows some degree of intelligence in communicating the fact to one another.

I must omit all mention about the insects, hoping to refer to the subject at some future time.

But I must end. Let me say one word in conclusion. Of all the sights I saw, everything was new to me; though fond of Botany, I had had but very few opportunities of becoming acquainted with tropical plants. I am short-sighted and even with the use of spectacles, a view, unless on a very clear day, is lost upon me to a great extent, and yet I can confidently state that every hour I passed in Brazil is graven on my memory and affords me an endless source of amusement and instruction. No doubt much, very much, of this is due to the great kindness of my friends, who were all anxious to let me see as much as possible, and spared no expense or trouble to make my visit pleasant: but still some of this must be attributed to the interest every thing awakened in me. If a view were cloudy, objects were near at hand to compensate for any trouble undertaken and never did I realize so fully the great use of such a Society as ours, in enabling boys to see and observe for themselves. We cannot hope, under present arrangements to prepare for Natural Science examinations, but we can encourage observation, and can give you some little insight into the beauties of nature. Let me then ask you to make as much use as you can of the Society whilst here; you must work for yourselves, but all that we can do for you shall be done and done willingly, and if you ever have the good fortune to be invited to see a tropical country, or in fact *any* country and can accept the offer, I can promise you as much pleasure as you can possibly have; no day will be too dull, no place too barren in which you cannot get *something* at least worthy of observation and study.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CATALOGUE

OF THE

ARCHÆOLOGICAL COLLECTION.

MARLBOROUGH COLLEGE

Natural History Society.

COMPILED BY

F. EDWARD HULME, F.L.S., F.S.A.,

Hon. Member M.C. Nat. Hist. Soc.

PART I.

"THE people of the next age shall know many things unknown to us; many are reserved for ages then to come, when we shall be quite forgotten, no memory of us remaining. Much work still remains, and much will remain: neither to him that shall be born after a thousand years will matter be wanting for new additions to what hath already been known."

SENECA.

MARLBOROUGH:
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1873.

CATALOGUE.

ARCHÆOLOGY, the study of the past, is a subject not unworthy of the attention which it has more especially in modern times received, for though at first sight a collection of broken pottery and apparently worthless fragments of stone or metal may seem but of little interest, and the accumulation of them a matter too trivial for any expenditure of time or labour, it has nevertheless a deeper interest attached to it than appears on a cursory glance, for as the zoologist or botanist while studying the varied forms of nature, so beautiful in themselves, so admirable in their manifest design feel impelled to look "from nature up to nature's God" and to join the glad pæan, "The Lord is good to all: and His tender mercies are over all His works. All Thy works shall praise Thee O God: and Thy saints shall bless Thee. They shall speak of the glory of Thy kingdom, and talk of Thy power. To make known to the sons of men His mighty acts, and the glorious majesty of His kingdom. Thy kingdom is an everlasting kingdom, and Thy dominion endureth throughout all generations"—so the archæologist musing over his fragmentary remains may see no less the wonderful workings of an over-ruling influence in all the mighty changes that have taken place in the history of man's dominion on the earth; indeed if it be true that "the proper study of mankind is man," little more need be said in justification of such a pursuit, since archæology in contradistinction to botany, astronomy, geology, and other natural sciences, dwells exclusively upon the footprints yet remaining of the bygone generations of humanity, recalling from the dust of centuries the pursuits of men of like passions with ourselves, awakening within our minds an essentially human sympathy, a recognition of the great brotherhood of man.

In small collections like our own, the specimens have little or no intrinsic or material value, but this is a matter that need trouble us but little, for the real value lies in the associations suggested, and if in our collection we are able by the aid of these associations to recall the mighty empire of Rome; Greece, so famous in art, literature and history, the wave of Moslem dominion that swept over Sicily and Spain, or the overwhelming of Pompeii, the historic interest awakened by our fragments will far outweigh any lower consideration. In the hope that we may thus be able to throw a new interest on our collection and evolve a living story from these dead relics of the past, we have drawn up the following critical catalogue of its contents. Two secondary motives have also influenced us in this, first to gather together our scattered riches, and to enumerate them with the system which is so desirable and

indeed indispensable in any collection worthy of the name, and secondly to detect by this means our deficiencies, and in so doing to point them out, in the hope that the many kind donors of the past, or others as generous, may on seeing the interesting nucleus we have collected, supply some of the many blanks which yet exist. We may perhaps be pardoned if we here mention a few *desiderata*. Any objects from Nineveh, Babylon or Persepolis, such as fragments of pavements, vessels of glass or metal, or portions of cuneiform inscriptions would be especially valuable, as we possess no memorials of the great Assyrian or Persian monarchies, nor have we with one or two small exceptions any mementos as *papyri*, *scarabæi*, &c., of ancient Egypt. Our present collection comprises many examples of Roman manufacture, (though mostly of a fragmentary nature) but is very inadequately supplied with Anglo-Saxon or Danish remains. Of the interesting historic period of the Moorish occupation of Southern Europe we possess but two relics, portions of the Alhambra palace. We are also destitute of any of the finer specimens of Greek pottery, and the many modifications of fine or industrial art, decorative or otherwise, as illuminated M.S.S., enamels, glass mosaic, stone carving, stained glass, memorial brasses, &c., which arose during the mediæval period.

A chronological table of the leading events of archæological, artistic, and historic interest will be found as an appendix, at the end of the catalogue. In drawing our few introductory remarks to a close we would desire on one or two points to disarm adverse criticism. Having hitherto spoken and pleaded in the cause of the Society, I may here in conclusion be permitted to drop the editorial "we," and to speak in my own proper person. Many shortcomings will doubtless be met with, but two very possible objections strike my own mind more especially, and on these I would desire to make a few remarks. I can easily for instance imagine that if my historical observations fall into the hands of a devoted antiquary, he may denounce them as the merest elements of the subject, a twice-told tale: in defence therefore I would plead that this catalogue has been primarily compiled for the boys who compose the working members of a school society, and that matters familar enough to the practised archæologist are frequently, when they chance to lie at all out of his ordinary course of reading, new and strange to the boy. A further objection may be raised as to the want of system shewn in arranging the specimens for cataloguing. "Why not have kept all the things from Pompeii together, and numbered the fragments of mosaic pavements *seriatim*?" In answer to this apparently very valid objection I would point out that our collection is fortunately a growing one, and fresh specimens having been from time to time presented while the catalogue was in course of compilation, they could only be inserted as received, since to put them under all circumstances in what strictly

speaking would be held to be their proper place might entail the renumbering of some fifty specimens, a process to be again and again repeated with each fresh acquisition; or the adoption of the somewhat clumsy expedient of using letters in aid of the figures as for instance No. 57, then 57 A, 57 B, &c. This latter plan has also this disadvantage, that one cannot, without counting right through the catalogue, tell the number of specimens in the collection. I now, in conclusion, feeling how valuable such school associations are, present this catalogue to the Marlborough College Natural History Society; few in number as these pages seem, they represent the pleasant toil of many hours, and they will I trust be accepted as a further proof of my desire to do all that lies in my power to advance the interests of our Society.

The whole of the objects herein mentioned are marked with Arabic numerals in blue; the dimensions given are inches and twelfths.

1.—Fragment of Samian ware, deep red colour, ornamented by radiating waved lines in relief. Found at Smithfield, presented by Mr. E. L. Hesketh.

Samos, one of the larger islands of the Grecian archipelago, is at present a part of the Turkish dominion. Its early history is lost, mythological fables supplying the place of more reliable information, though according to some writers it was founded by an Ionian colony B.C. 986. In 776 B.C. we find the Samians possessed of a large navy, and distinguished by their mercantile enterprise, carring on large trading operations with Egypt, and planting several colonies. The Samians were greatly famed for their proficiency in the arts, their coinage being especially deserving of attention, while the Samian pottery was, from its excellence, in general demand, and formed one of the principal objects of export. The Persians, Athenians, Egyptians, Syrians, Macedonians, Romans, Arabs, Venetians, Genoese, and Turks have all in turn contested the possession of the island. Herodotus, in narrating the life of Homer, mentions that during his wanderings he chanced to pass near the famous pottery. The potters begged him to compose a poem on their art, offering him the choice of any of their productions; the offer was accepted and the poem has descended to us. It dwells with great exactitude upon the method of manufacture and details the excellence of the results of the potter's skill. This interesting addition to our knowledge of the art-processes of antiquity is entitled "The Furnace." It is also valuable as showing that even in Homer's time, some nine or ten centuries before the Christian era the potteries of Samos were in full operation.

The term Samian must not however be understood to refer exclusively to the productions of Samos, on the contrary by far the greater number of examples of the so-called Samian ware are of Roman workmanship. Cuma, Capua, and Aretium were the chief seats of manufacture. Vases of this character had originally been manufactured at Samos, and were imported to Rome, hence when the Romans began the manufacture of similar ware, the name Samian became applied to it; in the same way that at the present day shawls similar in design to those imported from the east, though made in England are called Indian, or the still more striking anomaly in the name of the ink used by engineers, which largely made in London is nevertheless called Indian, and by a curious *non sequitur* is stamped with Chinese characters. The leading characteristics of the Romano-Samian pottery, are its clear bright red colour,

accompanied by a slight polish or thin glaze, and the smallness as a general rule of the objects, such as paterae, cups, and bowls. The ornament upon them is either of the simple nature seen in Nos. 1, 2, 3, 4 of our collection, or of the richer character of which we have examples in Nos. 8, 9, 10, where figures, animals, &c., are introduced in relief. This ware is by some writers termed Aretine, from Aretium; Samian is the more ordinary designation, though it unfortunately conveys a false idea. The whole of the examples in our museum are Romano-Samian.

2.—Samian ware, portion of patera, almost entirely plain; one narrow band of incised and radiating lines. A small portion of the foot remaining. Height seven-twelvths of an inch from bottom of foot to the flat and expanded portion of the patera. The foot judging from the fragment preserved must have been about six inches in diameter; found at Smithfield, presented by Mr. E. L. Hesketh.

Patera, (Latin *pateo*, to lie open), an open vessel resembling a broad flat dish or saucer, used by the Greeks and Romans in their sacrifices, the blood of the victim being collected in it for the necessary libations. The term patera hence becomes applied to any such open vessel, even if only for household use, and in no way identified with the service of the altar. The pateræ used in making libations at the funeral rites were ordinarily buried with the deceased, hence they are more frequently found in a good state of preservation than would otherwise be the case. Pateræ are met with of gold, silver, bronze, glass, and earthenware. The term patera is also applied to any circular, flat, or concave flower-like ornament, whether painted or in relief. The patera form is most commonly met with in classic, Renaissance, and Gothic architecture; see fig 1, a Norman example, fig 8 from the abbey church of Vézelay, France.

3.—Samian ware a fragment of a flat circular dish or patera having a raised rim ten-twelfths of an inch in height. No ornament on it with the exception of two concentric incised lines. Diameter of patera when entire, 7 inches. Found at Smithfield, presented by Mr. E. L. Hesketh.

4.—Samian ware, a fragment, ten twelfths of an inch high, of the rim of a patera or similar vessel, of which judging by the present piece, the diameter was about five inches. Ornamented externally with two narrow bands, and a third much broader. Found at Smithfield, presented by Mr. E. L. Hesketh.

5.—Samian ware, similar in all respects to No. 3.

In all early pottery we find the ornament of a very simple character, and such as could easily be produced while the vessel was still under the potter's hands; thus the concentric lines we have referred to in several of these specimens were produced by the momentary touch of some sharp object, while the vase or patera was revolving with great rapidity in a plastic state upon the potter's wheel. It is very interesting to observe in modern manufacture the

ease with which a broad band of colour can be thus put upon a plate or saucer by the instantaneous touch of the brush as the ware revolves. These incised lines, so easy to obtain when the vessel is in course of formation, become a permanent feature of the ornament when the pottery is baked. In the same way we find rude ornamental forms produced by broader sunken grooves disposed, not in concentric lines merely, but also in simple patterns; or in other cases by the pressure of the thumb upon the moist clay. Fig. 5,—a sketch of a vase from Nineveh in the British Museum is an elaborate example of the first of these primitive modes of decoration. Fig. 4,—also a vase from Nineveh, shews the second mode; while in fig. 6, a vase discovered at Bawdsey, in Suffolk, and now preserved in our national collection, we have the union of the two. Archaic in style as all these are, we cannot help feeling that in their simplicity of treatment there is also considerable beauty, and indeed the very rudeness of the work has its own special charm, as it testifies alike to the antiquity of the potter's art, and to that inherent love of the beautiful which, not content with the utility alone of an object, seeks to make it pleasing also to the eye. We see this same feeling exhibited in the rude designs scratched on the calabash of the African, and the elaborately carved paddle and club of the New Zealander. Of the extreme antiquity of the potter's art there can be no question. The invention of ceramic manufacture is so evidently coeval with the first dawn of civilization, that we look in vain for any account in the annals of man of its origin, as long before man had written records the potter's productions were in constant demand. Most early nations ascribe their knowledge of the art to the benificent regard and direct instruction of their gods. The Hebrew scriptures contain numerous allusions to the creations of the potter, and the processes employed by him. Thus in the denunciations uttered by the prophet Jeremiah against Israel we find the following passage:—"The Lord said to Jeremiah, arise and go down to the potter's house. Then I went down, and behold he wrought a work on the wheels; and the vessel that he made of clay was marred in the hand of the potter, so he made it again another vessel, as it seemed good to the potter to make it. And the Lord said, O house of Israel, cannot I do with you as this potter? Behold as the clay is in the potter's hand, so are ye in mine hand, O house of Israel." Allusions to the ceramic art are also frequent in the works of the Greek and Latin writers; thus in Plautus we meet with the line "*Vorsutior es quam rota figularis.*" Thou turnest more swiftly than the wheel of the potter. Good examples in addition to the "Furnace" of Homer already referred to, may also be met with in Horace and Juvenal, though it is needless to here quote them. A further proof of the extreme antiquity of the art is seen in the very interesting catacombs of Beni-Hassan, and Thebes. These, from internal evidence, the reading of the

hieroglyphics, &c., are known to date from about nineteen centuries before the Christian era; thirty-eight centuries, therefore, have passed away since their construction. Many very curious and historically valuable paintings are met with on the walls, illustrative of the daily life, pursuits, wars, ceremonies, and amusements of the ancient Egyptians; and amongst them a series depicting the various processes of the manufacture of pottery: thus we see the preliminary kneading of the clay, the formation of the articles on the wheel, the removal of the ware to the oven for firing. We have transferred one of these figures—a potter making a jar—to our sheet of illustrations, see fig. 12. Though representing the manipulation of so distant a period, the position of the hands and the peculiar rounding of the right arm are absolutely identical with the positions assumed by the workmen of the present time. The Staffordshire "hand" of the reign of Victoria is unable to improve upon the attitude which by experience had already so many hundreds of years ago been proved to be the most favourable for working by this humble subject of Pharaoh. We may also mention, as a curious fact, that besides the Egyptian pottery found in the tombs of Beni-Hassan, Philæ, and Thebes, numerous small vases of Chinese manufacture are also met with. The characters upon them are similar to those at present in use. This discovery testifies alike to a curious commercial intercommunication between these two distant nations, to the antiquity of the ceramic art amongst the Chinese, and to the no less striking antiquity of the curiously formed Chinese characters. These interesting relics of the art of the celestial Empire probably reached Egypt through India, the Egyptians having had commercial dealings with the latter from a very remote period. The almost universal custom in early ages of consecrating certain articles of pottery by employing them when cremation was practised, as the honoured receptacles of the dust of the departed; or, as we more ordinarily find, by burying them with the dead, has happily been the means of preserving in safety things in themselves so fragile, and has thus afforded us a valuable means of study that we could in no other way have acquired.

6.—Samian ware. Very broken fragment. Piece of what must evidently, from the slightness of the curve, have been a large vessel of some kind; portion of the foot also remaining.

7.—Samian ware. Portion of small vase, chiefly the foot. Diameter of foot one inch and seven twelfths. Potter's mark on it. A long and narrow oblong, crossed in the centre by a large circle; within the oblong some letters, illegible.

From the great ease with which the plastic clay can before baking be stamped or scratched, and the equal certainty that after it has passed through the fire any devices stamped or painted upon it remain an imperishable record

of its origin, great use has been made from the earliest times of one or other of these methods of identifying the ware with its seat of manufacture; while at other times these means have been employed to transmit to posterity the monarch under whose rule any great structure was erected. Thus the sun-burnt bricks, so extensively used by the Egyptians, were made at the government works, and stamped with the name of the Pharaoh (Egyptian, *Pa-Ouro*, the king), then reigning. The Assyrian and Babylonian sovereigns caused their names to be in like manner impressed upon the bricks before they were burnt. The Assyrian government potter was also largely employed in the fabrication of cylinders, or hexagonal prisms of clay. These were stamped all over in the curious wedge-shaped characters of Assyria with the government records. About ten thousand of these singular records were found in the palace at Kyonjik, built by Sennacherib about B.C., 702. Some hundreds of these are now preserved in the British Museum, the Louvre, and other national collections; many have been translated by experts and found to possess historic details of the highest interest and value: thus to mention one example alone, we have the history of Sennacherib's campaign against Judæa. His defeat is naturally not dwelt upon. The passage runs thus:—"Hezekiah, the king of Judah, who had not submitted himself to my authority, forty-six of his principal cities and fortresses* and villages dependent on them of which I took no account I captured, and carried away their spoil. I shut up himself within Jerusalem, his capital city. The fortified towns and the rest of his towns which I spoiled, I severed from his country, and gave to the kings of Ekron, Ascalon, and Gaza, so as to weaken his power. Over and above the former tribute imposed upon these countries, I added a tribute the nature of which I fixed." Roman tiles frequently have the date of their manufacture stamped upon them in bas-relief, or the names of the consuls at the time in power. The Roman soldiers were employed during times of peace in potting, road-making, or other useful labour. The bricks made by the military generally have the name and title of the legion or cohort or its commander stamped upon them in an abbreviated form, thus those that are found in the numerous excavations made for building purposes in the city of London are frequently stamped with the letters P. P. R. B. LON. an abbreviated form of *Proprætor Britanniæ Londinii*. Others have P. C. B. LON. *Prima Cohors Britonum Londinii*. The first cohort of the Britons, stationed at London. In more modern times this custom of placing upon some part of the object not exposed to view a distinctive mark has continued in force, thus the Dresden porcelain of the

"* Now in the 14th year of King Hezekiah did Sennacherib, king of Assyria, come up against all the fenced cities of Judah and took them."—II Kings, xviii, 13.

royal factory at Meissen has two crossed swords, while the ware produced at the celebrated Chelsea works was marked with an anchor, that of Derby had a D, surmounted by a crown, while the ware of Swansea has a trident.

8.—Samian ware. Small fragment, upon it in relief a running stag.

9.—Samian ware. The size and nature of the ornament shows it to be a portion of a large and richly decorated piece of pottery; portions of two human figures are distinguishable upon it. A small fragment of a foreign substance resembling slag or cinder has passed completely through it, caused by an accident during the firing. The ware is chipped all round it, efforts having evidently been made to dislodge it when detected.

10.—Samian ware. Fragment of large and elaborately enriched vase. In relief, a figure of nymph reclining against a rock, the right hand arranging her flowing tresses, while in the left she holds a small mirror.

The subjects of the bas-reliefs met with in the Romano-Samian vases are very varied in their character, some being derived from mythological sources, others from famous works of sculpture or architecture, gladiatorial combats, bands of animals, or a simpler class of designs based on arabesque, foliated, or floral forms.

11.—Specimens 11 to 18 inclusive are all examples of early pottery, probably British. Blue clay is the material employed, giving a dull and darkish grey effect after firing. None of them glazed on either inner or outer surface. No. 11 is evidently a portion of a strainer, being pierced over its whole surface with holes the tenth of an inch in diameter and about the third of an inch apart.

12.—Handle of vase, inner surface plain in section, outer surface composed of two parallel rounded mouldings.

13.—Portion of large vessel having almost upright sides. Upon it a rude zig-zag ornament in relief.

14.—A small and very irregular fragment, possessing no features of interest to call for any remark.

15.—A small portion of what, judging from the curve, must have been when entire a very large vase. A sunk line running round it, and a curious series of loops formed from one continuous line, identical in effect with the form that would be produced by writing a number of small e's, without removing the pen. This band of ornament was marked upon the ware with a small blunt tool while the clay was still plastic, as the forms are slightly sunk and the clay is from the pressure a little smoother than on the body of the fragment. The effect produced is however so delicate that it is only when the piece is held in a certain position to the light that the ornament becomes visible.

16.—Fragment of large vase. The decoration consists of two incised lines placed horizontally at a distance of one and three-twelfth inches apart,

between these and occupying the whole intervening space a closely set row of perpendicular cuts.

17.—Very small fragment. The ornament upon it is curious from its rudeness. It is composed of a series of small round pellets of clay touching each other and roughly flattened down.

18.—Portion of upright side of a large vase. The ornament consists, as shown in our second illustration, of two notched bands in relief.

19.—Piece of plaster, Roman. About three-quarters of an inch in thickness, one side smooth and stained of a deep red.

The Romans in the internal decoration of their houses largely employed a plaster or stucco of great beauty. The walls were first carefully as a ground work covered by a coarser plaster made by the admixture of pozzolana and lime. The final and outer coating was compounded of gypsum and pulverised stone or marble, and was termed *albarium* from its beautiful whiteness or *opus marmoratum* from its resemblance in appearance to marble. Upon this prepared surface the required designs were painted. The discoveries at Pompeii afford us a very good idea of the nature of those designs. The ordinary arrangement was to divide the wall of the room into three distinct horizontal portions, the lower part or *dado* being about one-sixth the height of the wall, then a broad space divided by painted pilasters into a series of large panels, and above all and extending downwards to the extent of one-fourth or fifth of the wall, the frieze. These broad divisions were ordinarily rendered very distinct by the system of colouring, the dado being generally darkest and richest in colour, the panelling lighter and more brilliant, and the frieze most delicate of all in tint. Our present specimen is no doubt a portion of such mural panel. In the centre of each panel was ordinarily placed some graceful figure such as a nymph, cupid, or bacchante, or at others a group representing some mythological or historical event or fanciful composition, painted with wonderful freedom and power of handling, while along the frieze we frequently meet with a series of figures, grotesques, animal forms, quaintly treated, garlands of flowers, or arabesque ornaments. Of some few of these fanciful animal forms we have examples in our 15th illustration. The whole style of the decoration introduced is, however, so capricious that it is impossible to lay down any laws or fixed principles.

20.—Boar's tusk. Often found with old pottery, probably used in the manufacture, to form the incised patterns on the vase before firing.

The wild hog, *Sus Scrofa*, the origin of our domestic race, though now long extinct in Britain, was at one time very common in these islands. It is still abundant in the forests of France, Germany, and other parts of Europe. The habits of the wild hog are nocturnal, the day being spent in its lair beneath the outlying roots of some great tree, a cave, or other similar dark

retreat in the thickest and gloomiest part of the forest. Considerable damage is done to the crops in the vicinity from the ploughing up of the ground by these animals in their search for acorns, roots, or grain. In all ages, classic, mediæval, and modern, the hunting of the boar has been a favourite sport with the privileged, and severe edicts have in past times been made for its protection. By one of the numerous laws of William the Conqueror for preserving the supply of animals for the chase, anyone detected in putting a stag, roebuck, or wild boar to death, was deprived of his eyesight, or even if the offence was an aggravated one, of his life; these being, in the old hunting phraseology, "noble beastes of Venerie." The huge canine teeth or tusks of the wild boar are very formidable weapons, and have frequently been used by the infuriated animal with fatal effect. They not unusually attain to the length of eight or nine inches. The fossil remains of several extinct species of an allied genus are met with throughout Europe. Amongst our Saxon forefathers the domesticated hog was held of great importance, a man's wealth largely consisting of his numerous herds of swine. Many nations hold the animal in abhorrence; neither Jews, Brahmins, Mahomadans, Abyssinians, nor Copts, will partake of its flesh, nor hold it as property. In ancient Egypt the swineherd was deemed polluted, and was prohibited from entering any temple; while the pig was consecrated to and held symbolical of Typho, the evil spirit.

21.—Fragment of early pottery. Pale cream colour; very rudely incised pattern. Curious from its unusual thinness, being scarcely the sixth of an inch thick.

22.—Fragment of red clay pottery, covered with an incised pattern composed of a series of almost contiguous upright rows of very minute lines. Each row is about ¼ inch wide, and contains from eighteen to twenty of these narrow lines in each inch of its length.

23.—Fragment of large vessel. Red clay. Roughly incised with a great number of small and slightly oblique gashes.

The colour of pottery is influenced by the clay used, its admixture with other substances, or the nature of the glaze employed. The white china which we ordinarily use, and which is at once so beautiful in its semi-transparent effect, the smoothness of its texture, and so remarkable from the cheapness at which it is produced, is made of the finest Cornwall clay, with a large admixture of flint. About 45,000 tons of clay and flint are transferred annually from Cornwall to Staffordshire for this manufacture. By the addition of manganese to the clay, a black ware is produced. The dull grey ware is made of the fine marl found in the Staffordshire potteries, between the coal strata, or a whiter clay is stained with the oxide of nickel. Various tints of brown are produced by the deep red clay as a base, combined with

oxide of iron, bole, and several other materials. Blue is produced by the addition of the oxide of cobalt. The ancient Egyptians employed a white ware, colouring it by oxides of tin, copper, manganese, and silver. One of these glazes, resulting in a delicate turquoise blue, was long kept a secret; the pottery thus coloured was largely exported to Italy, Greece, and other countries. Many beautiful specimens of it may be seen in the British Museum. The "body," as it is technically termed, of the pottery of the Assyrians was yellow; but they, like the Egyptians, were acquainted with the art of glazing it of various colours by means of metallic oxides. Many examples of this, dating from about nine centuries before our era, may be seen in our national collection. The Greeks used a fine white ware made of pipe-clay, and other kinds made of yellow ochre, brown ochre, and light red, composed of ground terra cotta; a more brilliant red being produced by the addition of oxide of iron. The black ware of the Etruscans was made of a clay mixed throughout with manganese and oxide of iron; these ingredients being incorporated with the clay, and not merely added as a surface glaze; the ware, as may easily be seen by examining a broken piece, is of the same colour throughout. The black ware of Etruria was largely exported to Rome. These Etruscans were a colony of Phœnicians, who emigrating from Tyre about ten centuries before the Christian era, established themselves in Italy. One of the districts of the Staffordshire pottery is called Etruria in honour of these early followers of the potter's art. The Romano-Samian ware we have already seen was of a clear and brilliant red.

In the flooring tiles so largely used in the churches of the middle ages, and the employment of which has lately undergone so great a revival, we find a curious application of the use of two or more clays to form one design. Red clay is taken as a basis, and by means of a 3-inch, 4-inch, or 6-inch mould is formed into a square of the required size, the face of this is then impressed with a die cut to the shape of the pattern: this sunken portion is then filled in with white clay of about the consistency of thick cream. After some considerable exposure to gentle heat, the surface of the tile is reduced to a perfect level, and the whole is then covered with a yellow glaze. The tiles are then exposed again for from ninety to one hundred hours in a kiln at an intense heat; after allowing them to cool gradually they are taken out, and the pattern is found developed for all future time in a clear yellow on a ground of rich reddish brown. Many fine examples of the original tiles, from various sources, may be seen in the British Museum, and that at South Kensington. In the latter there is an especially fine series from Chertsey Abbey. †

† Chertsey Abbey, founded in 666. Benedictine order. Erchendwald, who converted the Saxons to Christianity, was its first abbot. Though now but one small gateway remains, it was for many centuries the seat of one of the richest and most powerful religious bodies in the kingdom. King William confirmed at the conquest all that his predecessors had done, granting their possessions to them free of all tax and giving them entire jurisdiction over their broad lands. Dissolved by Henry VIII.

The ware known as Majolica owes, in addition to its artistic merit, much of its value and interest in the eyes of collectors to its lustrous metallic glaze. It derives its name from the island of Majorca, whence it was first brought to Italy, the great seat of its ultimate manufacture. The Mussulman king of the Balearic isles having by atrocious acts of piracy spread terror over all the maritime portions of France and Italy, and having at one time twenty thousand Christian captives suffering a cruel imprisonment at his hands, in the year 1113, at the great feast of Easter, the archbishop of Pisa in a burning discourse exhorted the Pisans to rush to the deliverance of their brethren, and to destroy the power of the infidels. Great enthusiasm was kindled, and men at once took up arms for a religious war. The conflict was a very prolonged and sanguinary one, Majorca, the chief town of the island of that name, resisted their efforts for a whole year; eventually however the Moslems were defeated, their king, Nazaredeck was slain, and the Pisans returned triumphant, with the rescued prisoners, to their native city, their galleys in addition being laden with spoils of war of immense value. Conspicuous amongst these trophies were the specimens of Majolica ware in question. For about two hundred years they appear to have been venerated as religious trophies, we have at least no authentic knowledge of any attempt being made to imitate them before the 14th century. Instead of preserving them in any public building, the Pisans built them into the external walls of their churches, thus in the very old church of Santa Apollonica there is a row of these plates extending along the west front of the building, and other rows along the sides, over the overhanging cornice. In some of the oldest churches of Rome and Pavia also they are met with under similar circumstances. In the year 1500 a school of artistic pottery arose at Pesaro, and produced many excellent works; the finest period however was between the years 1540 and 1560, the perfection of the work during that time being greatly due to the enlightened patronage and support of Guidobaldo the second, Duke of Urbino. He formed large collections of the drawings of Raffaele and other great masters for the elevation of the taste of his decorative artists, and by personal study and actual practice of the art testified the earnestness of his desire for its promotion. From the circumstances of many free renderings of Raffaele's work being thus met with upon the Majolica of Pesaro, some English writers have termed it Raffaele ware, but there is no sufficient evidence to confirm the early belief that the great artist ever himself painted any of the pieces, or that they were in even the most limited way executed under his direction, indeed those which connoisseurs unanimously recognize as the finest examples were not produced till some twenty years after his death. As it chanced that two of the most skilful artists of the factory bore the same honoured name a further element of uncertainty was introduced, as this circumstance no doubt helped to

increase the misunderstanding, since the work was thus truly performed by a Raffaele and was marked accordingly on the back of the ware, but it was nevertheless not the production of the Raffaele to whom our thoughts at once turn when the name is mentioned. The figures are ordinarily outlined in blue or black, the draperies being coloured, and the creamy white of the ground colour of the ware left for the flesh. The glaze is either of a rich ruby colour and metallic iradescent lustre, or a rich yellow having all the splendour and sheen of gold. Pesaro, Urbino, and Florence were all seats of the manufacture. The wares made at Gubbio are still more famous for their splendid lustre, the ruby tints of Pesaro being carried to a yet higher and unrivalled degree of intensity of colour, some examples are also noted for their golden or coppery lustres. Faenza (whence the term fayence applied by French archæologists and others to Majolica ware) Castel-Durante, Arezzo, Perugia, Bologna, Ferrara, Ravenna, Deruta and other Italian towns had also schools of ceramic art. Many fine examples of Faenza ware, generally known by its dark blue ground with arabesque forms in orange upon it, or alternate panels of those colours, may be seen in the South Kensington Museum. The death of Duke Guidobaldo was a heavy blow to the Florentine manufacture, as when his fostering patronage was withdrawn there was not a sufficient public demand for the higher class work to maintain the old standard of excellence. The importation also about this time of several fine examples of Chinese pottery into Europe and the consequent diversion of public taste, may have tended still further to influence adversely the sinking manufacture. The secret of the ruby lustre was lost even in the 16th century, though it has recently been imitated with a fair amount of success by the potters of Italy, France, and England. The various richly coloured lustres were produced by preparations of lead, silver, copper and gold, while a very brilliant white glaze with the prized metallic lustre was produced from tin.

24.—Fragment of a brick, Roman, red clay. A portion of the construction for heating a bath.

The use of the bath was an important feature of the daily life of the Romans in all towns of any size. The baths themselves, though originally of a simple and unostentatious character, utility being the great consideration in their construction, ultimately became one of the principal means for the display of that luxury and effeminacy which contributed so largely to the downfall of the Empire; thus Pliny for example in one of his writings holds up to reprobation the custom of floering the bath with silver, while the following extract from Seneca indicates still more fully the pitch of luxury arrived at in his day. "That person is now held to be poor and sordid whose walls shine not with a profusion of the most precious materials, the marbles of Egypt, inlaid with those of Numidia; unless the walls are laboriously stuccoed in imitation of

painting; unless the chambers are covered with glass; unless the Thasian stone, formerly a rare sight even in temples, surrounds those capacious basins, into which we cast our bodies weakened by an immoderate use, and the water is conveyed by silver pipes. As yet I speak only of plebeian baths: what shall I say when I come to those of our freedmen? What a profusion of statues! What a number of columns do I see supporting nothing, but placed as an ornament merely on account of the expense! What quantities of water murmuring down the steps! We are come to that pitch of luxury that we disdain to tread on anything but precious stones. Now we reckon a bath fit only for moths and vermin if its windows are not so disposed as to receive the rays of the sun during its whole course: unless from the bathing vessel we have a prospect of the sea and land; so that what brought crowds together to view and admire it when first built, is now rejected as antiquated, so inventive is luxury in finding new things to obliterate her own works." The size of many of the buildings was very considerable, thus the ruins of the baths of Caracalla at Rome extended over a square of which each side was about equal to a quarter of a mile, this is not surprising when we bear in mind that in addition to the rooms actually used for bathing in, there were others devoted to the exchange of the news of the day, large halls for athletic sports, and also extensive gardens within the circuit of the walls.

The following extract from Eustace, an old writer, in reference to the baths of Caracalla will be of interest. "At each end," he says, "were two temples, one to Apollo, and another to Æsculapius, as the tutelary deities of the place, sacred to the improvement of the mind, and care of the body; the two other temples were dedicated to the two protecting divinities of the Antonine family, Hercules and Bacchus. In the principal building were, in the first place a grand circular vestibule, with four halls on each side, for cold, tepid, warm, and steam baths; in the centre was an immense square for exercise when the weather was unfavourable for it in the open air; beyond it a great hall, where sixteen hundred marble seats were placed for the convenience of the bathers; at each end of this hall were libraries. This building terminated on each side in the court surrounded with porticoes, with an *odeum* for music, and in the middle a spacious basin for swimming. Round this edifice were walks shaded by rows of trees, particularly the plane; and in its front extended a gymnasium, for running, wrestling, &c., in fine weather. The whole was bounded by a vast portico, opening into *exhedræ* or spacious halls, where the poets declaimed, and philosophers gave lectures to their auditors." The construction and maintenance of baths and the provision of public sports were the two means ordinarily resorted to by the Roman emperors to preserve and increase their popularity with the multitude, hence it happens that in the city of Rome alone, in addition to those of Caracalla, we have the baths

of Nero, Titus, Diocletian, and Domitian. In some cases a small fee was charged, viz., the fourth of an *as*, a sum scarcely of equivalent amount to a farthing of our money, but very frequently the public had the use of them gratuitously; Agrippa for instance bequeathed his private baths with their surrounding gardens, for the use of the citizens, free of cost, leaving certain estates for their support. The walls of the baths were richly decorated, the floorings were of elaborate mosaic, and a great use, as we see from our extract from Seneca, was made of sculpture. The famous Farnese Hercules was discovered in some excavations made in 1540 on the site of the baths of Caracalla, while more recently the no less renowned group of the Laocoon was recovered from the ruins and debris of the baths of Titus.

The system of bathing practised by the Romans, though somewhat similar to that of the Turks and Russians, differed in some respects. It was as follows —on entering the building the *capsarii* or slaves to guard the clothes and portable valuables of the bather were in attendance. After undressing he proceeded to the *unctuarium*, where he anointed himself according to his means and tastes, a great choice of unguents and perfumes, of varying cost and possessing various qualities, being placed at his disposal. The old writers mention amongst many others with which we are not now familiar, preparations of roses, myrrh, lavender, vine, cinnamon, thyme, and mint. After anointing, the bather passed into the *sphæristerium*, a room devoted to various exercises, and after taking a due amount of exertion the *caldarium* was entered, the room devoted to the actual bathing. The baths being very warm, the bather on completing his ablutions, on passing from the *caldarium*, entered the *tepidarium*, and remained there some time in conversation, reading or listening to orations, that the body might not be suddenly exposed to the outer air after the great heat of the *caldarium*. The *frigidarium* was then entered in order to still farther soften the transition. The heat of the various apartments was regulated by an elaborate system of pipes passing from the furnace or *hypocaustum*. The furnace was generally beneath the *caldarium*, and by means of openings in flues let into the floors and walls the due amount of heat was maintained.

25.—Portion of ligulate handle of vase. Buff clay. The width of the handle is 1¼ inches: its thickness five-twelfths of an inch. The interior surface is plain, the exterior fluted by three roll mouldings.

26.—Fragment of glass. From the bed of the Thames. Presented by Mr. E. L. Hesketh. Rich play of iradescent colours.

The manufacture of glass is of the highest antiquity. On the mural paintings of the tombs of Beni Hassan, naar Thebes, which we know from historical evidence to have been executed more than 3,800 years ago, many interesting illustrations are given of the daily life of the Egyptians, and

amongst these we have a group of glass-blowers at work with their blow-pipes and furnace. Bottles and other objects of glass are also commonly found in the tombs, and Strabo speaks of a certain kind of earth found near Alexandria, "without which," he says, "it is impossible to make certain kinds of glass of many colours and of a brilliant quality." Such too was their practical skill that they imitated with success the emerald, amethyst, and other precious stones, while some mock pearls discovered by Sir Gardner Wilkinson were so well counterfeited that he tells us a strong lens was needed to detect the imposition. Glass beads were much used by the Egyptians for necklaces, and arranged in a kind of ornamental network for the adornment of mummy wrappings, this network being generally placed over the breast of the deceased. Many examples of this may be seen in the British Museum. Alexandria was for a long time a very important seat of glass manufacture, and from thence the Romans for a considerable period drew their supply. The Phœnicians established considerable factories at Sidon, probably based upon experience from Egyptian sources derived in their voyages. The supply of glass for Greece was for a great length of time derived from the Sidonians, though ultimately the secret of manufacture leaked out and the Greeks established glass-works of their own. Many beautiful glass vessels have been found amongst the ruins of Herculaneum and Pompeii. The Romans were well acquainted also with the art of colouring glass and the manufacture of lenses as a means of kindling fires, &c. In one of the plays of Aristophanes, who wrote his comedies some four centuries before the Christian era, we have a curious passage illustrative of this last use of glass. One of his characters, Strepsiades, says—"You have noted a pretty toy, a trinket in the shops, which being rightly held, produces fire from things combustible—put now the case! Your bailiff comes, shews me his writ. I standing thus, do you mark me, in the sun's stream, measuring my distance, guide my focus to a point upon his writ, and off it goes, in smoke." Pliny, speaking of glass in the 36th book of his Natural History, says that some mariners who had a cargo of soda (or nitre) on board their vessel, having landed on the banks of the river Belus, a small stream at the foot of Mount Carmel, for want of available stones placed their cooking pot upon some blocks of soda, which being fused by the heat with the sand of the river bank, produced a liquid and transparent stream, and that such was the origin of glass. This explanation of the discovery of glass, though the one ordinarily quoted, is open to one great objection—a much greater temperature is needed to cause fusion than any that we have at all a right to assume probable or even possible in the circumstances of the narrative. Pliny, writing about the year of our Lord 70, speaks in high terms of the produce of the glass works of Sidon, "whence," he says, "came in former times all the beautiful glass that we now possess;" he also refers to the Gaulish glass-workers. The

Gaulish and Gallo-Roman tombs contain almost invariably urns, cups, and lachrymatories. The glass of which they are made is generally beautifully iradescent, and glows in different lights in all the colours of the rainbow. This peculiar prismatic colouring (see present specimen) arises from decomposition of the surface, and was not the original intention of the makers. The famous Portland vase, preserved in the British museum, with its figures in white and in high relief on a ground of rich blue, is one of the noblest examples extant of the skill of the Romans in the art of glass making. During the middle ages Venice was the chief source of supply, the productions of the little island of Murano being in request throughout the whole of Europe. Many curious varieties were produced, such as the enamelled, and the filagree glass, or *Latticinio*, in which thin threads of differently coloured glass are incorporated in the body of the vase, and by curious methods of manipulation formed into a delicate lattice-work (hence the name) of coloured lines within the general colourless mass of the vessel. *Aventurine* was produced by mingling small filings of gold with the glass in the making. These particles in the body of the glass have a brilliant and beautiful effect. We need not here speak of the various modifications recognized by the modern manufacturer, such as crown, flint, blown, cast, plate, &c., though we may mention that so great is the use of glass, and more especially since the repeal of the duty in 1845, that of one description only—plate—more than 3,000,000 feet are annually made, at an estimated value of about £470,000. The colouring matter required in staining glass is very small in proportion to the mass of glass to be stained. One twenty-thousandth part of gold will give a rose-coloured tint, while six cwt. of glass will become a rich ruby red by the addition of four ounces of the oxide of gold; or the same quantity, six cwt., will become a golden topaz colour by the addition of three pounds of oxide of uranium; while a like quantity will be made a brilliant azure blue by the addition of six pounds of the oxide of copper.

27.—Neck of earthen vessel, height of fragment 2¾ in., diameter of mouth 2 in. A very small portion of its single handle remaining. Two very large and coarsely incised lines round the neck.

28.—Roman lamp. Perfect. Dark red ware; diameter of circular part, 2¾ inches; total length, including handle, 4 inches. Winged female figure in centre in relief.

No articles perhaps are more ordinarily met with than lamps, in all excavations in search of Roman antiquites. They may be met with of every variety of size and design, and of every degree of value, some being of the simplest construction, while others show great elaboration, at no doubt a proportionately enhanced cost. The materials used are earthenware, bronze, and iron, or in the more elaborate specimens inlays of several metals are intro-

duced. A great variety of these lamps may be seen in the British Museum. The lamp was ordinarily placed upon a candelabrum, a tall and slender stand having a broad base, and a flat top of sufficient size to hold the lamps securely. These were generally of bronze, though some few have been found of iron. They invariably stand upon three ornamental feet, ordinarily those of griffins or lions; while in some cases the shaft is made telescopic, so as to enable the light to be raised or lowered at will.

29.—Small fragment of Roman glass found at Ostia.

Ostia, the *Ostium Tiberinum* was the port of Rome. Founded by Ancus Martius. Though now a complete and desolate ruin, it was, under the Romans, a large and important town. Ostia was destroyed by the Saracens in the 5th century, and has never been rebuilt. A modern town has grown up at about a mile from the ancient Ostia. Ostia, originally at the mouth of the Tiber, is now, owing to the action of the sea, about three miles inland.

30.—Irregular fragment of jet from Popeii.

31.—Polished jet. Pompeii. Portion of a necklace. Pierced near the upper part for threading. Oblong, ten-twelfths of an inch by seven-twelfths. The inner side flat, the outer slightly convex.

32.—Small fragment of dove-coloured marble, with purple blotches and veins. Pompeii.

33.—Piece of red brick. Pompeii. Nothing to call for remark: its interest consists exclusively in the associations connected with the locality where found.

Pompeii, it is perhaps scarcely necessary to remind my readers, was an ancient Roman town, which, from its position, near the base of mount Vesuvius, was overwhelmed during a volcanic eruption in the year 79 of our era. Though originally a maritime town, changes of the sea line have resulted in its being now some distance inland. The name of the city is met with from time to time in Roman records, and in the writings of several of the Roman authors, though it seems to have been rather as a place devoted to recreation, a watering-place like our modern Brighton and Scarborough, than from any higher and historic interest. It suffered very severely from earthquakes in the years 63 and 64 of our era, and fifteen years afterwards perished together with a neighbouring city Herculaneum during the eruption of Vesuvius we have already alluded to; Pompeii being overwhelmed by the showers of ashes, Herculaneum by streams of molten lava. Owing to this difference in the elements of destruction, we meet with numerous relics from Pompeii, the ashes being removable without much difficulty, while but few remains of Herculaneum are accessible, as the lava on hardening becomes like rock, rendering excavation exceedingly difficult and tedious. The showers of stones and ashes, though causing a deposit of varying

depth, form a mass seldom more than about twelve feet in depth, while Herculaneum, from its nearer proximity to Vesuvius, has had successive streams of lava from time to time rolling over it, till the city lies buried beneath from eighty to a hundred feet of superincumbent rock. Dion Cassius mentions in his writings that the volcanic dust, during the eruption when these two cities were destroyed, was so abundant that even at Rome the light of the sun was clouded; it also reached Syria and Egypt.

Two letters written by the younger Pliny to Tacitus the historian are fortunately extant, and though their length is somewhat considerable, their interest, Pliny being an eye-witness of the scenes he describes, is so great that I think I am justified in introducing them. "Your request that I would send you an account of my uncle's death, in order to transmit a more exact relation of it to posterity, deserves my acknowledgements; for, if this accident shall be celebrated by your pen, the glory of it, I am well assured, will be rendered for ever illustrious. And notwithstanding he perished by a misfortune, which as it involved at the same time a most beautiful country in ruins, and destroyed so many populous cities, seems to promise him our everlasting remembrance; notwithstanding he has himself composed many and lasting works; yet I am persuaded the mentioning of him in your immortal works will greatly contribute to maintain his name for ever. Happy I esteem those to be, whom providence has distinguished with the abilities either of doing such actions as are worthy of being related, or of relating them in a manner worthy of being read; but doubly happy are they who are blessed with both these uncommon talents; in the number of which my uncle, as his own writings and your history will evidently prove, may justly be ranked. It is with extreme willingness, therefore, I execute your commands; and should indeed have claimed the task, if you had not enjoined it. He was at that time with the fleet under his command at Misenum. On the 24th of August, my mother desired him to observe a cloud which appeared of a very unusual size and shape. He had just returned from taking the benefit of the sun, and after bathing himself in cold water, and taking a slight repast, was retired to his study. He immediately arose and went out upon an eminence, from whence he might more distinctly view this very uncommon appearance. It was not at that distance discernible from what mountain this cloud issued, but it was found afterwards to ascend from mount Vesuvius. I cannot give a more exact description of its figure, than by comparing it to that of a pine tree, for it shot up a great height in the form of a trunk, which extended itself at the top into a sort of head; occasioned, I imagine, either by a sudden gust of air that impelled it, the force of which decreased as it advanced upwards, or the cloud itself being pressed back again, by its own weight,

expanded in this manner; it appeared sometimes bright and sometimes dark and spotted, as it was more or less impregnated with earth and cinders. This extraordinary phenomenon excited my uncle's philosophical curiosity to take a nearer view of it. He ordered a light vessel to be got ready, and gave me the liberty, if I thought proper, to attend him. I rather chose to continue my studies: for as it happened, he had given me an employment of that kind. As he was coming out of the house he received a note from Rectina, the wife of Bassus, who was in the utmost alarm at the imminent danger which threatened her: for her villa being situated at the foot of mount Vesuvius, there was no way to escape but by sea: she earnestly entreated him, therefore, to come to her assistance. He accordingly changed his first design, and what he began with a philosophical, he pursued with an heroical turn of mind. He ordered the galleys to be put to sea, and went himself on board with an intention of assisting not only Rectina, but several others; for the villas stand extremely thick upon that beautiful coast. When hastening to the place from whence others fled with the uttermost terror, he steered his direct course to the point of danger, and with so much calmness and presence of mind, as to be able to make and dictate his observations upon the motion and figure of that dreadful scene. He was now so nigh the mountains, that the cinders, which grew thicker and hotter the nearer he approached, fell into the ships, together with pumice stones, and black pieces of burning rock: they were also in danger not only of running aground by the sudden retreat of the sea, but also from the vast fragments which rolled down from the mountain and obstructed all the shore.

Here he stopped to consider whether he should return back again, as the pilot advised. "Fortune, said he favours the brave: carry me to Pomponianus." Pomponianus was then at Stabia. He had already sent his baggage on board; for though he was not at that time in actual danger, yet being within the view of it, and indeed extremely near, if it should in the least increase he was determined to put to sea as soon as the wind should change. It was favourable, however, for carrying my uncle to Pomponianus, whom he found in the greatest consternation: he embraced him with tenderness, encouraging and exhorting him to keep up his spirits, and the more to dissipate his fears, he ordered, with an air of unconcern, the baths to be got ready; when after having bathed he sat down to supper with great cheerfulness, or at least (what is equally heroic) with all the appearance of it. In the meanwhile the eruption from mount Vesuvius flamed out in several places with much violence, which the darkness of the night contributed to render still more visible and dreadful. But my uncle in order to soothe the apprehensions of his friend, assured him it was only the burning of the villages, which the country people had abandoned to the flames: after this he retired to rest, and

it is most certain he was so little discomposed as to fall into a deep sleep; for being pretty stout and breathing hard, those who attended without heard him snore. The court which led to his apartment being now almost filled with stones and ashes, if he had continued there any time longer, it would have been impossible for him to have made his way out: it was thought proper therefore to awaken him. He got up and went to Pomponianus and the rest of his company, who were not unconcerned enough to think of going to bed. They consulted together whether it would be more prudent to trust to the houses, which now shook from side to side with frequent and violent concussions; or fly to the open fields, where the calcined stones and cinders, though light indeed, yet fell in large showers, and threatened destruction. In this distress they resolved for the fields, as the less dangerous situation of the two; a resolution which while the rest of the company were hurried into by their fears, my uncle embraced upon cool and deliberate consideration. They went out then, having pillows tied upon their heads with napkins; and this was their whole defence against the storm of stones that fell around them. It was now day everywhere else, but there was a deeper darkness prevailed than in the most obscure night; which however was in some degree dissipated by torches and other lights. They thought proper to go down farther upon the shore to observe if they might safely put out to sea; but they found the waves still ran extremely high and boisterous. There my uncle, having drunk a draught or two of cold water, threw himself down upon a cloth which was spread for him, when immediately the flames, and a strong smell of sulphur, which was the fore-runner of them, dispersed the rest of the company, and obliged them to rise. He raised himself up with the assistance of two of his servants and instantly fell down dead: suffocated, as I conjecture, by some gross and noxious vapour, having always had weak lungs, and being frequently subject to a difficulty of breathing. As soon as it was light again, which was not until the third day after this melancholy accident, his body was found entire, and without any marks of violence upon it, exactly in the same posture that he fell, and looking more like a man asleep than dead. You will choose out of this narrative such circumstances as shall be most suitable to your purpose; for there is a great difference between what is proper for a letter and a history; between writing to a friend, and writing to the public. Farewell."

In answer to a further appeal to him from Tacitus for still further information, he goes on to say—"The letter which in compliance with your request, I wrote to you concerning the death of my uncle, has raised, it seems, your curiosity to know what terror and dangers attended me while I continued at Misenum, for there I think the account in my former letter, broke off. My uncle having left us I pursued the studies which prevented my going with him, till it was time to bathe, after which I went to supper and from thence to

bed, where my sleep was greatly broken and disturbed. There had been for many days before, some shocks of an earthquake, which the less surprised us as they are extremely frequent in Campania: but they were so particularly violent that night that they not only shook everything about us, but seemed indeed to threaten total destruction. My mother flew to my chamber, where she found me rising in order to awaken her. We went out into a small court belonging to the house, which separated the sea from the building. As I was at that time but eighteen years of age, I know not whether I should call my behaviour in this dangerous juncture, courage or rashness, but I took up Livy and amused myself with turning over that author, and even making extracts from him, as if all about me had been in full security. While we were in this posture, a friend of my uncle's, who was just come from Spain to pay him a visit, joined us; and observing me sitting by my mother with a book in my hand, gently commended her calmness, at the same time that he reproved me for my careless security. Nevertheless, I still went on with my author. Though it was now morning the light was exceedingly faint and languid: the buildings all around us tottered, and though we stood upon open ground, yet as the place was narrow and confined, there was no remaining there without certain and great danger: we therefore resolved to quit the town. The people followed us in the utmost consternation and, as to a mind distracted with terror, every suggestion seems more prudent than its own, pressed in great crowds about us in our way out. Being got at a convenient distance from the houses, we stood still in the midst of a most dangerous and dreadful scene. The chariots which we had ordered to be drawn out, were so agitated backwards and forwards though upon level ground, that we could not keep them steady, even by supporting them with large stones. The sea seemed to roll back upon itself and to be driven from its banks by the convulsive motion of the earth: it is certain at least that the shore was considerably enlarged and several sea animals were left upon it. On the other side a black and dreadful cloud bursting with an igneous serpentine vapour darted out a long train of fire, resembling flashes of lightening, but much larger. Upon this our Spanish friend, whom I mentioned above, addressing himself to my mother and me with great warmth and earnestness: "If your brother and your uncle," said he, is safe, he certainly wishes you may be so to, but if he has perished, it was his desire no doubt that you might both survive him: why therefore, do you delay your escape a moment?"—We could never think of our own safety we said while we were uncertain of his. Hereupon our friend left us, and withdrew from the danger with the utmost precipitation. Soon afterwards the cloud seemed to descend over the whole ocean: as indeed it entirely hid the island of Capreæ, and the promontory of Misenum. My mother strongly conjured me to make my escape at any rate, which as I was

young I might easily do; as for herself, she said, her age rendered all attempts of that sort impossible. However, she would willingly meet death if she could have the satisfaction of seeing that she was not the occasion of mine. I absolutely refused to leave her, and taking her by the hand, I led her on: she complied with great reluctance, and not without many reproaches to herself for retarding my flight. The ashes now began to fall upon us, though in no great quantity. I turned my head, and observed behind us a thick smoke, I therefore proposed while we had yet any light, to turn out of the high road lest she should be pressed to death in the dark by the crowd. We had scarcely stepped out of the path when darkness overspread us, not like that of a cloudy night, or where there is no moon, but of a room when it is shut up, and all the lights extinct. Nothing then was to be heard but the shrieks of women, the screams of children, and the cries of men: some calling for their children, others for their parents, others for their husbands, and only telling each other by their voices: one lamenting his own fate, another that of his family: some wishing to die for the very fear of dying; some lifting their hands to the Gods: but the greater part imagining that the last and eternal night was come, which was to destroy the Gods and the world together. Among these were some who augmented the real terrors by imaginary ones, and made the frightened multitude falsely believe that Misenum was actually in flames. At length a glimmering light appeared, which we imagined to be rather the fore-runner of an approaching burst of flames, as in truth it was, than the return of day. However, the fire fell at a distance from us: then again we were immersed in thick darkness, and a heavy shower of ashes rained upon us, which we were obliged every now and then to shake off, otherwise we should have been crushed and buried in the heap. At last this dreadful darkness was dissipated by degrees like a cloud of smoke and the real day returned, and even the sun appeared, though very faintly as when an eclipse is going on. Every object that presented itself to our eyes (which were extremely weakened) seemed changed, being covered over with white ashes as with a deep snow. We returned to Misenum, where we refreshed ourselves as well as we could, and passed an anxious night between hope and fear; though indeed with a much larger share of the latter: for the earthquake still continued, while several people ran up and down heightening their own and their friend's calamities by terrible predictions. However, my mother and I, notwithstanding the danger we had passed and that which still threatened us, had no thoughts of leaving the place till we should receive some account of my uncle. And now you will read this narrative without any view of writing it in your history, of which it is by no means worthy: and indeed you must impute it to your own request if it shall deserve the trouble of a letter. Farewell."

For 1676 years Pompeii remained hidden and forgotten, indeed so utterly was its existence unsuspected that vineyards flourished and corn waved over it for centuries. In 1689 attention was drawn to some slight indications of ruins cropping up out of the soil, but nothing of any importance was done till 1755. The line of the ancient walls has been traced, and up to the present time about a third of the city has been excavated. Pompeii was not overwhelmed however by a single eruption; eight successive layers can be traced, and that these several deposits of matter took place at considerable intervals is evident from the fact that though the city was ultimately completely destroyed, a sufficient time of comparative safety elapsed to allow the bolder inhabitants to return and remove their most cherished valuables, since but few portable articles of any intrinsic worth are met with; a further proof of this lies in the fact that the lowest layer shows evident marks of having been disturbed by people in quest of such valuables, while the subsequent layers have fallen like the untrodden snow upon the devoted city, and by their undisturbed condition testify that Pompeii was then left in her ruin and desolation. The French Government in the first place, and afterwards the Italian, have for many years been carrying on the work of excavation, so that now the traveller as he walks through the streets and sees the temples, forum, basilica, baths, amphitheatre, shops, street fountains, tombs, domestic residences, &c., is able to form a very good idea of the appearance presented by a Roman city. Many of the things discovered eloquently testify to the unexpected nature of the catastrophe, as for example the skeletons crowded together in narrow rooms, people overtaken by the sulphurous vapour, or doomed to lingering starvation from inability to pierce through the rising wall of ashes. Bread baking in the oven for a repast which never came, tables with provisions spread out, and a dove sitting in her nest have also been found, while perhaps, the most striking of all is the remains of four offenders who were confined in the stocks. The key had been thrown to them that they might save themselves, but it was found on excavating that it had fallen just out of their reach, and while with their bodies at full stretch upon the pavement they were endeavouring to grasp it, they were overwhelmed in the common destruction and perished miserably.

34.—Small fragment of red glazed pottery. The lip of a large vase. From Ostia.

35.—Same as the above, but instead of the lip being rounded it is flattened. On the small horizontal surface thus produced, is a delicate pattern of radiating lines.

36.—Oblong tessera, grey stone, portion of the cement in which it was imbedded still adhering to it. Tessera is the term applied to the small, and generally quadrangular, pieces of stone, marble, or vitreous material used in

the formation of mosaics. It is derived from the Lat. *tessera*, a square piece, Gr. *tessares*. *Tessella*, the diminutive of the word, supplies the derivation of the word tesselated, applied to pavements thus composed.

37.—Portion of pavement from Ostia. Eight tessera cemented together, the backing of cement being still attached. Each tessera a parallelogram of about seven-twelfths of an inch by five-twelfths, and a thickness of half an inch. A considerable thickness of a very coarse cement between each tessera.

Mosaic has been employed from the earliest ages of which we have any knowledge. Pavements of various marbles thus combined, were in common use in Greece in the days of Alexander of Macedon. In the book of Esther mention is made of one in the palace of king Ahasuerus. The Romans derived the idea of using mosaic, like they got most other artistic things, from the Greeks. It was first introduced into Rome about B.C. 100 and arrived at its greatest perfection about the reign of Hadrian. Scarcely a single residence in Pompeii, which we have seen above, was destroyed A.D. 79, but has its elaborate flooring of mosaic. Several modifications are recognised by archæologists, of these we may simply refer to the following. The opus *tessalatum*, the most ancient kind ; small blocks of stone or marble worked into simple right line patterns : our present specimen is an example of this, many fine examples have also been found in England, and in fact wherever the Romans held sway. The *opus figlinum* ; the previous mode of working being found somewhat dull in effect, the present was introduced, the tesserse being produced artifically from compounds of silex and alumina, and the colour given by metallic oxides. Many advantages attended the use of this method, as for instance, greater variety and richness of colour, much greater ease in shaping the tesserse, the cost of production much less than in the previous style, where costly natural marbles were employed. *Opus incertum*, composed of irregular fragments of all kinds of marbles, not generally arranged in any pattern, but pleasing to the eye from the variety of colour. *Opus vermiculatum*, the highest development of all, where the intention is pictorial rather than ornamental, imitative rather than conventional, the pictures thus produced being employed as wall decorations. Vitreous compounds were chiefly employed in it. When Rome ceased to be the capital of the Empire and Byzantium became the new seat of Government, mosaic underwent a great change under the greater Eastern influence with its taste for gold and splendour of effect, a great use being made of glass, from its brilliancy, and the great variety of rich colouring thus obtainable. The three great divisions of Byzantine mosaic are first, the *opus musivum*, a glass mosaic used only for pictorial representations ; Saints, Martyrs, and Apostles being thus depicted on a golden ground. Many fine examples may be seen at St. Mark's, Venice, and throughout the churches

of the Greek faith in Russia. Though the execution is often very coarse, the figures have a very gorgeous and solemn effect, seen in the subdued light of the interior of the church. Secondly, the *opus Grecanicum*, a minute tesselation, bedded in white marble, and much used in pulpits, screens, &c., the patterns being geometric, and most elaborate in design. Thirdly, a marble tesselation used chiefly for pavements, and known as the *opus Alexandrinum*. We may mention that in one of the recent Reports of the Society, a paper on Mosaic will be found, which gives much fuller details on the subject than we are from exigencies of space here able to do.

38.—Portion of Roman pavement. Flooring tile, from Caistor. Given by Mr. J. W. Mills.

39.—Large fragment (5 inches by 4½, and one inch thick) of wall plaster. Pompeii. Three fourths of the thickness of the piece are composed of very coarse material, large stones, portions of shell, &c., being imbedded in it, the remaining fourth of a much finer substance. Upon this as a face three horizontal bands of crimson are painted, the upper being lighter than either of the other two, while the lowest is so dark that it appears almost black.

40.—Kimmeridge coal money, presented together with the following specimens up to No. 52, by the Rev. J. S. Thomas. Diameter 1½ inches. Thickness eight-twelfths. Diameter of square recess five-twelfths. No further device on it. These relics of antiquity, though ordinarily known as coal money, have long been a mystery to archæologists, their use as money being merely one of the theories which have been proposed as a means of accounting for them. They derive the name Kimmeridge from being chiefly found near a bay of that name in Dorsetshire, though they are also met with in several parts of the Isle of Purbeck. The cliffs surrounding Kimmeridge bay are of a soft and laminated shale of a dull black colour, and it is of this rock that the coal money is made. In excavating, vases and urns of two kinds are met with, some being of black earthenware of a very rude construction, while others are of a highly finished red pottery, richly ornamented, and in every way of excellent quality. Coal money is frequently, together with the bones of animals, found in both these descriptions of pottery. These remains are met with, at a depth of from one to three feet, in subterranean chambers formed of slabs of the Kimmeridge rock. The so-called money is perfectly circular, the edge being surrounded by mouldings evidently turned by a lathe. The diameter varies from one inch to about three, and the thickness from a quarter to three quarters of an inch, some of the smallest pieces being thickest in substance. Almost all have a square recess on one side (ten out of the twelve in our collection, for example), and often a curious arrangement of lines perpendicular to the sides of the square, as shown in our seventh illustration, may be met with. Occasionally other devices are found: a central round hole; two such

holes at equally different space from the common centre; or three, four, or five circles arranged at equal distances from the centre, and near the edge of the piece, may be met with. Our eighth illustration shows us the rude triangle upon No. 48; No. 46 has an almost identical pattern. A theory has been held that they were intended to string as bracelets for personal adornment or to be worn as amulets, this however seems untenable as ordinarily there is no means of thus stringing them. In only one of the twelve specimens we possess, for instance, does the square opening pass right through; it therefore is the only one out of the dozen that accommodates itself to this theory. They can scarcely have been used as money since they are so very local, and of a material too fragile for such a use. All clue as to the makers is completely lost. They cannot be of British manufacture, as they are so extremely local; the two very different kinds of pottery found, seem to indicate a national intercourse between a rude and a highly civilized people, probably therefore the limited area over which they are found is the site of some ancient colony, a belief still further encouraged by the fact of its being on, or near, the coast. The remains cannot be Roman, or similar remains would doubtless have been found elsewhere, nor would the Romans or any other war-like people have established themselves in a position so unfit for a military station. It is conjectured that the remains are Phœnician, the Phœnicians, a great mercantile people being known, on the authority of Strabo and other writers, to have visited Britain at a very early period for purposes of barter, supplying the natives with pottery, &c., in exchange for tin, and that finding both clay and coal in the isle of Purbeck, they instead of importing, established a colony there for the fabrication of the pottery thus required.

41.—Kimmeridge coal money. Diameter 2 inches. Thickness four-twelfths of an inch. Diameter of central square recess seven-twelfths of an inch. No device on it. The central square recess goes completely through, so that it could if need be, be strung as a charm or ornament.

42.—Kimmeridge coal money. Diameter 1½ inches. Thickness seven-twelfths of an inch. Diameter of central square six-twelfths of an inch. No further device on it.

43.—Kimmeridge coal money. Diameter one and nine-twelfths. Thickness eight-twelfths of an inch. Diameter of central square six-twelfths. The depth of the squares is about equal to their diameters. Many of the pieces are somewhat choked up, but in the present example the bottom of the recess can be seen. It is five-twelfths of an inch deep: it passes therefore, as do all of them, very nearly throughout the entire substance. The device is shewn in our seventh illustration.

44.—Kimmeridge coal money. Diameter 1½ inches. Thickness six-twelfths of an inch. Diameter of central square six-twelfths of an inch. No further device of any kind.

45.—Kimmeridge coal money. Diameter one and ten-twelfths. Thickness three-twelfths. Diameter of central square six-twelfths. No further device.

46.—Kimmeridge coal money. Diameter 1½ inch. Thickness ¼ inch. Central square, none. Pattern as shewn in our eighth illustration.

47.—Kimmeridge coal money. Diameter two and three-twelfths. Thickness eight-twelfths. Central square eight-twelfths. Pattern similar to that shewn in our seventh illustration.

48.—Kimmeridge coal money. Diameters one and eight-twelfths. Thickness seven-twelfths. No central square. Device similar to that given in our eighth illustration.

49.—Kimmeridge coal money. Diameter one and three-twelfths. Thickness nine-twelfths. Central square five-twelfths. No further device of any kind upon it.

50.—Kimmeridge coal money. Diameter 2 and two-twelfths. Thickness five-twelfths. Square seven-twelfths: In this example the square is not quite in the centre, and as this is as good a shape as any of the others it would seem to prove that the square recess is a device, and not a mere central hole for the mechanical process of turning on a lathe. No further pattern on it.

51.—Kimmeridge coal money. Diameter 2 and two-twelfths. Thickness seven-twelfths. Central square seven-twelfths. Lines surrounding the square very similar to those seen in our seventh figure.

52.—Portion of pavement, Roman, from Bignor in Sussex, given by the author.

Some seventy years ago the holder of a little freehold at Bignor was struck by the difficulty he several times experienced in ploughing a portion of his land, and seeing that one day he had uncovered a portion of what seemed to be a picture, he set diligently to work and cleared a considerable space, laying bare the richly tesselated pavements of the flooring of several of the rooms of a Roman Villa. The news of the discovery soon spread, and though the British Museum authorities were desirous of acquiring the finest portions, he determined to leave them *in situ*, erecting sheds over the whole and charging an admission fee of one shilling to the numerous visitors who flocked from all parts to see the remains. The property has now passed into the hands of his descendants, the remains are however still scrupulously preserved and indeed form a good source of income to their possessor. Bignor is about five miles from Arundel.

53.—Fragment from one of the Irish round towers. A peculiar, laminated texture of stone, of an ashy grey colour. Presented by Mr. A. C. Champneys.

These towers, like the coal money, have been the source of much perplexity to antiquarians, and though numerous theories of more or less probability have been started from time to time, no definite knowledge has been

acquired as to their use or the people who built them, though the balance of evidence seems to point to their Christian origin. The tower at Donoughmore has a rude sculpture of the crucifixion over the entrance doorway. These curious buildings are also found in connexion with old ruined churches and ancient burial grounds. It is surmised that they served as bell-towers. About one hundred and twenty of these towers are known to have been built, though probably others may have been destroyed by time or violence at a period when no record of them was preserved. About ninety still remain, some few of them are perfect but the greater number are in various stages of decay. The average height is from ninety to a hundred feet, with a diameter of about fifteen feet at the base. The walls at the ground level are from three to five feet thick; the towers taper slightly, and the walls gradually lessen in thickness as they rise. Some theorists ignoring such evidence as the sculpture of the crucifixion, or holding that it may have been carved and inserted at a comparatively much more recent date than the rest of the building, think that these towers were erected by fire-worshippers. This does not appear at all probable, but we quote it as an example of the various startling theories propounded, and as being at least illustrative of the obscurity surrounding the subject.

54, 55, and 56.—Fragments of the granite used in the construction of the Mormon temple, Salt Lake City. Presented by T. E. Ollivant, Esq.

A considerable amount of hesitation existed in my own mind at first as to whether these specimens could legitimately be included in our Archæological catalogue, dealing as that should do, with relics of the past alone: since however we may fairly believe that Mormonism has run its course, to be numbered now, or very shortly, amongst the things that were: we have, finding these amongst the other specimens requiring cataloguing embodied them in our list. Salt Lake City, situated in the territory of Utah, was established by the Mormons, or as they style themselves, Latter Day Saints, after advancing civilization and the force of public opinion had driven them from Nauvoo in Illinois State. In 1846 Brigham Young, the successor of Joseph Smith, (who was killed by an armed mob who broke into the gaol where he was confined) set forth with his people into the wilderness; after a year of wandering they at length fixed upon the banks of the Salt Lake as their future home, and here they established the "City of the Saints." Apart from the peculiar institution of polygamy it is but just to say that while their industry has caused the barren desert to become a flourishing settlement, crime, in the ordinary sense of the word, has been almost unknown. For years one billiard saloon and four bars for the supply of intoxicating liquors were found sufficient for the demands of a city of 30,000 inhabitants, though doubtless the approach of the Union Pacific railway with its attendant "Gentiles" will cause rapid changes in

this, no less than in many other ways. Mr. Hooper, the late delegate in Congress for Utah mentioned that in twenty years time the Mormons have built up Utah, from a desert waste, in a locality 1,200 miles from any other settlement or navigable river. The territory contains upwards of 100,000 inhabitants, and an area of 75,000 square miles; emigration from Europe has been proceeding steadily at an average of about 2000 souls annually, a fund known as the "perpetual emigrating fund" having been in full working and organisation for twenty years, about two thirds annually of the emigrants deriving advantage from it, and repaying the loan by instalments. There are eighty-five flourishing towns, in addition to Salt Lake City. The Temple, though commenced eighteen years ago, has at present only the granite foundations laid, and will probably now never be completed, at least not for its original purpose. The worship of the people, pending the completion of the Temple, is conducted in the Tabernacle, a vast room with a dome roof, a feature tending to make it very conspicuous in any views of the city. It is capable of holding ten thousand persons.

57.—Portion of pavement. Baths of Caracalla, Rome. Black marble beautifully mottled with irregular and closely set blotches of dark green. Presented by W. E. Mullins. For an account of the baths at Caracalla refer back to No. 24.

58.—Key of Marlborough Castle. Fastened to it a piece of parchment with the following inscription: "Nov. 26th, 1830. The Key of the original castle at Marlborough, found at the time of the riots A.D. 1830 by (name illegible), and presented by him to W. Binsden." Iron seven and seven-twelfths of an inch long. Much worn and very rude in form and manufacture. Presented to our collection by Mr. Wm. Weeldridge. See illustration XI.

Though no traces of the castle now remain, it was for some centuries a place of considerable strength. It is first mentioned in connection with William the Conqueror, who caused bishop Agelricus to be confined therein on account of his opposition to the new order of things; he also instituted a mint here, an additional proof that the place must have been, even at that early date and in those troublous times, of some considerable strength and importance. We do not in historical records meet with any further mention of the castle till the year 1110, when Henry I held his court here for some considerable time. In the next reign, that of Stephen, Marlborough comes more prominently into notice, the castle being held on behalf of Matilda, and taking its full share of hard blows in the struggle for supremacy between the two claimants for the throne. John, the eldest son of Henry II lived here, the castle being granted to him as a residence by that monarch, and he afterwards on his accession to the throne maintained intimate relations with the place, lodging much of the royal property in the castle, and granting the burgesses

of Marlborough numerous privileges by charter. In the disaffection of the barons Hugh de Neville, governor of the castle, maintained his allegiance against all threats, and was one of the few who at Runnymeade appeared on the king's side. Henry III, like several of those who preceded him, seems to have often visited Marlborough Castle, numerous royal papers dated from thence being in existence. Edward II granted the castle to his favourite, Hugh Le Despencer, depriving the queen dowager of it for that purpose, though bestowed upon her as a residence for life by Edward I. During the stormy times of the parliamentary war Marlborough twice in the interests of the parliamentarians sustained a siege, Prince Rupert commanding in person on behalf of the Royalists on the second occasion. As years rolled on and the old times of internal strife came to an end the castle lost more and more its original military character, and gradually merged into the country house, passing into the possession of the great Seymour family, who held it from the reign of Edward IVth, to the middle of the 18th century. The old buildings were then let as an Inn, Marlborough being in coaching times a place of much life and business. These stirring days however came to an end, and with the destruction of the coaching interest by the era of railways, the business of the Castle Inn at Marlborough withered and ceased, and on the building again changing ownership, it became the nucleus of a new public school, the present Marlborough College.

59.—Fragment of stone from Queen's tomb. Thebes.

Thebes, the date of whose ruin is earlier than the foundation of almost all other cities, offers at the present day a spectacle most interesting from its grandeur, most impressive in its desolation and decay. "Its monuments," as Professor Heeren very truly says, "testify to us of a time when it was the centre of the civilization of the human race; a civilization it is true, which has not endured, but which nevertheless, forms one of the steps by which mankind has attained to higher perfection." The land of Egypt for many centuries was divided into several small kingdoms. But these in self defence against foreign aggression ultimately became united, about 1600 B.C., into one powerful empire, the city of Thebes being the capital, in the same way that we have in our own time seen Italy "a geographical expression" for so many years, become a powerful and united nation, and all provincial jealousy being cast aside, hailing Rome as the mother city of the State. After the union of the several Egyptian kingdoms the land speedily banished the invader, and for some hundred of years continued to increase in prosperity without molestation from without, until it arrived at that pitch of national greatness referred to by almost all the leading writers of antiquity, and of which we have a further material testimony in the magnificence of its remains. The first symptoms of decadence are perceptible about the beginning of the eighth century before our

era, when the Egyptian king Sabacon invaded and ravaged the land. In the year 525 B.C. the Persian king Cambyses swept over the country and held it in bondage till the Persian power in turn had, 332 B.C., to bow beneath the conquering sway of Alexander of Macedon ; while the ruin and decay of this once mighty ancient monarchy was consummated when some thirty years before the Christian era, it sank into a state of vassalage before the rising strength and ambition of the Roman power. It is matter of small surpise, seeing how wave after wave of war has swept over the land, that her noblest temples should now be but ruinous heaps. Thebes, the chief seat of religion and of the monarchy, was by the priests called Amunei, the abode of Ammon, a divinity who occupied a similar place in Egyptian mythology to that of Zeus amongst the Greeks, or the Roman Jupiter. A second name arose from the Egyptian word *tape*, which signified head or chief, pronounced in the Memphitic dialect, Thaba; this the Greeks modified into Thebai, and from this form of the word the transition to our modern name is obvious enough. The earliest mention of Thebes is in Homer, who flourshed about the 10th century B.C. and it is evident from his allusions that it was even at that time of world-wide fame both from its regal magnificence and its military power.

60.—Roll of Mummy cloth. Presented by Sergeant Adams. Very yellow with time, much tattered, no pattern on it. Six inches in width and ninety-six inches long.

A slight sketch of the funeral rites of the Egyptians may not be altogether without interest. Directly after death the body was embalmed and the various processes adopted are described by several of the ancient historians. Herodotus gives the following account.—"In Egypt," he says, "certain persons are appointed by law to exercise this art as their special function, and on the bringing of a dead body to them, they produce figures of mummies in painted wood, the most elaborate of these are said to be of him whose name it does not seem to me here right to mention, (Osiris). The second is simpler and of less cost, while the third is cheapest of all. Having exhibited these, they then enquire of the persons who have applied to them which of these they chose, and this matter being settled and the terms agreed on, the relations of the dead retire, leaving the body in the hands of the embalmers. In preparing it according to the first method, they begin by extracting the brain with a curved iron instrument, partly cleansing the head by this means and partly by pouring in certain drugs ; then making an incision in the side with a sharp stone they draw out the internal organs through the opening. Having cleansed and washed them with palm wine, they cover them with powdered aromatics, and on filling up the cavity with myrrh, cassia and fragrant-spices, they sew it up again. This being done the body is salted, being kept in natron for seventy days. When the 70 days are passed, the

body is washed and wrapped in bands of fine linen, secured by a gum. The friends then come for the body and place it in a wooden case made in the form of a man, and fastening it up, keep it awhile in an upright position in one of the rooms of their house. This is the most expensive way of embalming. In the second kind they fill the body with oil of cedar, but do not remove the organs, and keep it in salt the required number of days. The cedar-oil is then taken out, and from its strength brings with itself all the internal parts in a state of dissolution, dissolving also the main part of the flesh and leaving little else but the skin and bony framework. This being done, the body is restored without any further operation. The third kind is only used for the very poor, the body being cleansed by the use of a drug called Syrmœa, and after the necessary immersion in brine for the required seventy days, returned without manipulation to the relatives." Diodorus gives a very similar account of the processes employed by the ancient Egyptians in the preservation of their dead. Herodotus does not tell us what was done with the internal organs in the most costly system of embalming; the tombs and monuments themselves however supply us with this knowledge, as in the place of burial we find not only the body in its mummy-case, but also four curious vases, one having a cover representing a human head, another with the head of an ape, a third like the head of a jackal, while the fourth was in the form of the head of a hawk. These four vases were the receptacles of the various organs, each vase having its special application, and being in all cases used for the same organs. When the body had been duly prepared by one of the three processes already described, it was enveloped in linen bandages; many of these bodies have been unrolled and have been found to be swathed with more than a thousand yards, considerably over half a mile, of the wrappings. It was then placed within the cartonage, a covering of thick paper moulded to the form of the body and painted with figures and other objects of symbolic meaning. The portion of the cartonage covering the face of the mummy was painted to resemble the deceased, eyes of enamel being inlaid, and the hair represented in the natural plaits, curls, or other mode of wearing it. At times the face of the cartonage was covered with leaf gold. Upon the breast of the dead a scarabœus, with extended wings, was placed; this was of stone, silver or pottery and symbolised the protecting influence of the deity. The cartonage was generally enclosed in three or four other cases of similar nature, all brilliantly painted with devices, but not of so rich a character as the cartonage proper. The outer case of all was either of wood or of stone; when of wood it was adorned with hieroglyphics, and paintings of a religious and emblematic character; when of stone it was generally richly carved. Frequently the figure of the deceased was sculptured in full relief upon the lid. The Egyptians lavishly decorated their tombs, many of

them consisting of several communicating chambers, all richly painted. They were of brick or stone, or if possible hewn in rock. Before the rites of sepulture could take place the past life of the deceased had to undergo a rigid examination at the hands of a tribunal appointed to judge the conduct of the dead during his past life time. Even kings were not exempt, for we read in Diodorus "that the customary trial having commenced anyone was permitted to present himself as an accuser. The priests first passed an enconium upon the monarch, detailing all his noble deeds, and pointing out his virtues; to these the thousands assembled assented with joyful acclamations if they felt the praises to be deserved, or if on the contrary his life had been marked by injustice, or other things unworthy of a king they showed their disapproval by loud murmurs; several instances are recorded of Egyptian monarchs thus deprived of the honour of the customary public funeral." In the same way judgment was held upon even the meanest, for we learn also from Diodorus that "it was lawful for any person who thought proper, to bring forward an accusation against the dead, no matter what their condition in past life. If it could be established that he had led a bad life it was so declared by the judges and the body was deprived of funeral rites, but if the accuser was unable to substantiate the charges he had made, he was heavily punished." When no one came forward thus to accuse, or when any charges so made were disproved, the relatives of the dead pronounced eulogies upon him, extolling his piety and honour, and supplicating the gods to receive him to their eternal favour, and the body was then laid in the tomb which had been prepared for its reception. A man who died in debt could not have the usual honour paid to his remains until the relatives had satisfied the just claims of his creditors, hence originated a custom of depositing the body of a parent or their near relative as a security for the re-payment of borrowed money, those who failed to redeem so solemn a pledge being subject to the greatest ignominy, and deprived of burial at their own decease. It is interesting to see the collateral testimony borne by the Scriptures to this Egyptian custom of embalming the dead, and to find the remarks of ancient heathen writers illustrated and confirmed by the pages of the inspired record; thus in the 50th chapter of Genesis, and at the 2nd and 3rd verses, we read "And Joseph commanded his servants the physicians to embalm his father; and the physicians embalmed Israel. And forty days were fulfilled for him; for so are fulfilled the days of those which are embalmed; and the Egyptians mourned for him threescore and ten days." Again at v. 26. "So Joseph died being an hundred and ten years old; and they embalmed him, and he was put in a coffin in Egypt." Jacob's body was immediately borne for sepulture to the land of Canaan, but Joseph's remains were carried by the Israelites throughout the forty years of wandering, and it was not till the

full conquest of the land of promise that they were committed to their final resting-place; we read in the book of Joshua that "the bones of Joseph, which the children of Israel brought up out of Egypt, buried they in Shechem in a parcel of land which Jacob bought of the sons of Hamor for an hundred pieces of silver." No other nations, ancient or modern, have carried their lamentations for the dead to so extravagant a length as the Egyptians. During the period of mourning the relations of the deceased abstained from meat and wine, neglected their persons, casting dust upon their heads, rending their garments, and indulging in plaintive songs in praise of the dead; these customs were afterwards adopted in part by the Israelites. We read that when the body of Jacob was brought over the Jordan, a halt of seven days was made, in which the mourners indulged to the full their sorrow. The nomade and warlike Canaanites regarded so great a display of grief as unmanly, and were so struck by an exhibition of feeling so new to them that they perpetuated the memory of it by naming the place Abel Misraim, meaning Sorrow of the Egyptians. Many of the lower animals were deemed sacred by the Egyptians; of these the bull Apis, visible symbol of their great deity Osiris; the cat dedicated to the goddess Pasht; and the jackal of Anubis are examples. These creatures, together with the ram, monkey, crocodile and others were carefully embalmed, and their mummies either buried with the human remains or enshrined in a sepulchre of their own, thus Belzoni in his excavations found one tomb filled with nothing but cats. "The carcasses of dead cats are removed," says Herodotus "into sacred apartments, and after they have been embalmed, they are religiously entombed in the town of Bubastis." If a cat was killed, either designedly or inadvertently, death was the punishment. During the reign of Tiberius, 7000 Roman soldiers were killed in a tumult by the Egyptians because one of the legionaries had wilfully killed one of these sacred animals. In the 16th and 17th centuries mummy was one of the ordinary drugs of the apothecary, though from the difficulty of acquiring it, it was of great cost; this led to the commission of numerous frauds, the dead bodies of slaves and criminals being prepared with asphaltum and dried in the sun, and palmed off as the genuine article.

61.—Small box containing eleven tesserae (white, red, black, &c.) from various sources.

62.—Fragment from Stonehenge, a species of cement or concrete: a gravelly material interspersed with irregular lumps of chalk of various sizes. Exceedingly light compared with its bulk.

The researches of the antiquary have effected but little of any value in determining either the origin or the intention of Stonehenge: all connected with these remarkable relics of the past is lost in darkness, and mankind must

probably now be content, for all future time, to remain in ignorance of their history and purport. This absence of any reliable knowledge on the subject has not however prevented, but has rather fostered, the development of many curious theories; of these we may here just mention a few.—Dr. Stukeley, an enthusiastic archæologist, writing in 1743, regards the whole as a druidical temple, a belief which has since received the adhesion of most modern antiquaries. Dr. Smith, writing in 1771, considered that Stonehenge was druidical in its origin, but of astronomical rather than religious import. In support of this theory he considered that the thirty outside pillars symbolised the days of the month; the seven trilithons, the seven planets, or the seven days of the week. Inigo Jones held a most extraordinary theory, he believed that these ruins were the remains of a Roman temple, and that these irregular masses of stone were originally columns of the architectural order known as Tuscan, a strange opinion coming from an architect of his knowledge and eminence. Speed expressed his opinion that Stonehenge was of a monumental character, being erected by Aurelius in memory of his nobles, who in the year 475 were treacherously slain in this neighbourhood by the Saxons under the leadership of Vertigern. Some writers have ascribed it to the Phœnicians, others as being Danish, others again as the work of the British. Numerous legends assigned it to the great enchanter Merlin, the tradition being, that by exercise of the black art he transported the stones from Kildare in Ireland, while other mythical accounts attribute it to a race of giants. Its ancient British name *Choirganer*, the dance of giants, is a further illustration of this old belief. The two most remarkable theories perhaps are those that respectively consider it to be a temple dedicated to Buddha, the Druids being, to suit this belief, held to be a race of emigrated Indian philosophers; and that which believed it to be the work of an antediluvian race its present ruinous condition being ascribed to the damage sustained by it at the time of the flood. The name Stonehenge is Saxon, being derived from the words *stan*, a stone, and *heng*, to hang or support, in obvious allusion to the large superincumbent masses of the outer ring of trilitherns. Each upright stone, on its extremity being buried in the earth, has had the cavity filled up for greater security with a kind of rubble or cement: of this material our specimen is an example. We have refrained from giving any description of the ruins themselves, as their appearance must be so familiar to all our readers, but we may just mention in conclusion the curious fact that while the outer ring of stones (diameter 106 feet, and containing 30 stones) is composed of the tertiary sarsen rock abundantly found in the neighbourhood, the stones of the inner and, as it is supposed, older ring (diameter 83 feet, 56 stones) are igneous, and must have been brought to the spot from a great distance.

63.—Small Roman vase. Two handles. Widest diameter 1¼ in., diameter of mouth ¼in. Height one and five-sixths of an inch. A drawing of this vase is given on the plate of illustrations: see fig. 9.

64.—Small Roman bottle. Green glass. Neck circular; sides of body flattened out into a roughly cubical form. Diameter of mouth ⅜ of an inch. Height one inch and two-thirds. See the 10th illustration on the sheet of figured examples.

65.—Fragment of Moorish glazed tile from the palace of the Alhambra, Granada. 8¾ inches long. One and one-sixth of an inch wide. Bright green. Presented by H. O. Yeatman, Esq.

The Alhambra, deriving its name from the arabic *Kal-'at al hamra*, the red castle, was the great fortress-palace of the Moorish rulers of Granada. The stern grandeur and massive simplicity of the exterior is in marked contrast to the delicate beauty of the palace within, where all that luxury could suggest or the most refined art could effect ministered to the gratification of the conquers. The buildings were commenced by Ibnu'l Ahmar in the year 1248, continued throughout the whole reign of Abu Abdillah his son, and completed in 1314. Time and wanton destruction combined with repeated whitewashing and so-called restorations have now destroyed much of the original character, though enough still remains, even if of fragmentary character, to testify to the former beauty of this great bulwark of the Moorish power in Spain.

66.—Portion of diaper-work from the Alhambra. Conventionalised foliated ornament in relief. No trace of colour. See illustration 14. Presented by H. O. Yeatman, Esq.

The ornamental designs of the Mohammedan races possess one striking feature in common, the exclusion of all naturalistic representations; so that while in Egyptian art we find the ibis, lotus, papyrus; in Greek, the vine and olive; in Roman, the acanthus; in Chinese, the sacred bean and bamboo; in Celtic, entwining serpents; in Gothic carving and illumination, the ivy, buttercup, oak and maple; we meet with nothing of the kind in the art of the purely Mohammedan races. Their art sprang from their religion and by the tenets of the Koran they were strictly forbidden to make the likeness of any created thing, animate or inanimate. This law was not so strictly adhered to by the Persians and Moors as by the other Mohammedan races, so that amongst these, occasional violations, as in the case of the lions supporting the fountain in one of the courts of the Alhambra, may be met with. The Mohammedans are divided into two great sects, the *Sunnees*, those who pride themselves on a strict adherence to all the requirements of the prophet; and the *Shiya'as*, a term more particularly applied to the Persians, who through their greater laxity are scarcely regarded by the more orthodox as Mohammedans at all. The two sects even where, as in the cities of India,

they are brought into close contact, do not intermingle in any way, each in rigid isolation consigns the other to Iblees. The ornament of the Moors was particularly brilliant in effect, great use being made of scarlet, blue and gold, and more rarely of white, deep chocolate, and black, the result, owing to the due observance of the proportion employed of each tint, being very rich. The restoration at Sydenham of a portion of the Alhambra gives a good idea of the character of Moorish art, and is of a perfectly reliable nature as every detail has been taken from the original building.

67.—Title page of a book, "The Generall Historie of Women: of the most holy, and prophane; the most Famous, and Infamous in all Ages." Presented by the Rev. G. G. Bradley. On the back of the page is the inscription given in fac-simile in our 13th Illustration—"F. Seymours Beoke. Given her by her Deare Brother Charls Lord Seymour. 1658, at Morle Brought." The lady, whose writing gives so interesting a character to the old title page, was Frances, daughter of Sir Francis Seymour, first Lord Seymour of Trowbridge, and sister of Charles, second Lord. Refer back to no. 58.

68.—Block of grey plaster or cement from the Temple of Jupiter, Pompeii. Presented by W. E. Mullins, Esq. This building, though ordinarily known as the Temple of Jupiter, has been considered by some writers to be the Senaculum, or council chamber. It is of the Corinthian order. The interior of the building was painted, red and black being the colours chiefly employed. The floor is of marble mosaic. The whole of the building, constructed as it is of stone and lava, has been afterwards covered over with a fine white and very hard cement; our specimen is a fragment of this outer coating.

69, 70, 71.—Three pieces of early British pottery, found at Sunbury, Middlesex. Enclosed with the specimens when presented was the following extract from the "Field" newspaper—

"There is no doubt that the neighbourhood of Sunbury, and from thence to Chertsey, was the scene of important and interesting events in the time of the Romans; indeed, the whole valley of the Thames more or less played its part in the history of that period. What history it might have had a thousand years or so before Cæsar crossed the Thames at Coway Stakes (which is in the immediate neighbourhood of Sunbury) and routed Cassivelaunus, it is difficult to imagine, and can only be arrived at by strong conjecture, assisted by a sort of comparative anatomy of habits and institutions which have perhaps long survived even any knowledge of their founders. For some time ancient British remains have been known to exist upon the lands owned by Mr. Leonard, of Spelthorne Cottage, hard by the Sunbury railway station. In a field belonging to this gentleman, midway between the station and the windmill, the plough has from time to time turned up fragments of pottery. At the first glance perhaps, these to the uninquiring mind, would be supposed to

resemble portions of broken and long-buried flower pots ; but on nearer examination they were found to be of very different structure and consistence. Very old coins too, had been found on Mr. Leonard's property, one of which, a small silver one of an ancient British king, was sold to the British Museum for £35, only two others of the same date being known to exist.

Mr. Leonard's attention was first called to the existence of ancient pottery on this spot while digging for gravel ; and Mr. Ashby, of Staines, taking great interest in the antiquities of his neighbourhood, obtained the presence of some gentlemen eminent in the archæological world—Messrs. E. Roberts and G. Wright, the secretary and curator of the British Archæological Society, and Mr. Black, also a well-known antiquarian—and Mr. Francis Francis, and had the ground explored in the presence of these gentlemen one day last week. Singular to relate, there is no barrow, nor any signs of one, on the spot, and Mr. Leonard who has known the neighbourhood intimately for upwards of fifty years, declares that there never was one there within his recollection. The spot is within fifty or sixty yards of the road, and whether there was ever a barrow there, which was removed or levelled long before Mr. Leonard's time, or whether the remains discovered may be said to be those of some pre-barrow period (if we may so characterise it), we cannot tell. It must be noted that, if ever any barrow did exist, it must have been an unusually large one, from the space covered by the relics. At present the urns discovered lie for the most part only about from twelve to eighteen inches below the surface, most of them having had the upper portions broken off and destroyed by the plough. There appeared to be no method or regular form of general deposit that could be traced, the direction in which the urns had been buried running from south-west to north-east, though they were constantly found in small groups or circles, indicative to some extent of family or tribal arrangements, and these were even placed so closely together that the hand could not be inserted between them. The vessels were of various shapes, and of the rudest form and workmanship, and so far gone, partly from external injury and partly from the friable and frangible nature of the pottery, that hardly any of them could be got out whole, even with the greatest care and the assistance of plaster of Paris, cement, &c., which was used to hold them together in the inside—an assistance which Mr. Leonard very skilfully availed himself of. The shapes are in some instances those of large flower pots ; in others rather spherical, like a big Stilton cheese ; one, rather diminished in circumference towards the top, was of true urn shape. Ornamentation there was very little that could be seen. On one there was a projecting ridge round the middle, and fragments of another were obtained which had the lips of the jar shelved outwards, and which was nicked on the edge. The consistence of the pottery showed a very low scale of skill on the part of the potters. The urns appear

for the most part to have been composed of unbaked or very lightly and partially baked clay—sun-dried possibly, and perhaps partially scorched in the process of incremation carried out on the remains which were deposited in them, most of them being filled with charred bones, ashes, fragments of flint, &c.; while much of the soil around and near the urns was composed of charcoal—whether animal or vegetable could not immediately be determined, but probably both had contributed to form the masses discovered. It was impossible to fix any date to the period when these remains were deposited in the earth. It was thought by the distinguished antiquarians present that they were certainly from 2000 to 3000 years old, probably above 2500. But it would seem as if the specimens discovered were unique, or at any rate exceedingly rare, as few, if any, records appear of any similar ones buried under like circumstances, and certainly there are (or were but lately) none amongst the collection in the British Museum."

The pieces in our collection are of a very fragmentary character, but from the degree of curvature they are all evidently pieces of urns of very considerable size.

In addition to the fore-going examples in our Museum, we have a very fine collection of flint implements and weapons, presented by the Rev. F. W. Farrar, F.R.S.: W. Fergus, M.D., and other kind donors. To have included these in our present catalogue would, owing to their number, have caused the present part to grow into a more bulky work than on several accounts seemed desirable. It has therefore been deemed better to reserve them as a nucleus for a second part: for thanks to the growing nature of our Archæological Collection, the present catalogue will need amplifying from time to time as the specimens presented to the Society continue to increase in number.

APPENDIX.

Table of dates of events mentioned in the Catalogue, or otherwise interesting on Archæological, Scientific and Artistic grounds.

A.

Alexander destroys Persepolis and Susa	B.C.	332
Alexander dies at Babylon	„	323
Appelles, painter, flourishes	c. „	328
Ashurakbal builds N. W. palace, Nimroud... ...	„	900
Athens, so called	„	1235
Augustus Cæsar conquers Egypt	„	38
* Abbey, Bury St. Edmonds, began	A.D.	1070
„ Chertsey „	„	666
„ Crowland „	„	1255
„ Fountains „	„	1132
„ Furness „	„	1127
„ Glastonbury „	„	1185
„ Kelso „	„	1128
„ Kirkstall „	„	1152
Abbey, Lacock, began	A.D.	1232
„ Melrose „	„	1327
„ Netley „	„	1239
„ Reading „	„	1121
„ Rievaulx „	„	1131
„ Tewkesbury „	„	1103
„ Thornton „	„	1382
„ Westminster „	„	1041
Alaric Sacks Rome	„	410
Amiens Cathedral commenced	„	1220
Amrou, Mosque of, at Cairo, commenced	„	642
Angelo, Michael, born 1474, died	„	1563
Antiquaries of London, Society founded	„	1707
Antoninus Pius, builds wall	„	140
Austin Friars established in England	„	1250

* In all cases the date of the beginning of the historic building is given, though no doubt in many cases earlier buildings of a similar character existed on the site: thus for example the date given for Glastonbury is really the re-building, a former building of which we have but imperfect information having been destroyed by fire.

B.

Babylon built by Nebuchadnezzar	B.C.	600
Babylon taken by Cyrus	,,	556
Babylon taken by Darius	,,	517
Britain, Cathaginians trade with	,,	460
Britain, first invaded by the Romans	,,	55
Bangor Cathedral commenced	A.D.	1509
Baths of Caracalla	,,	212
Bayeux Cathedral commenced	,,	1077
Bayeux tapestry	,,	1066
Benedictines established in England	,,	596
Bernard Palissy born 1510, died	,,	1589
Bible translated by Wickliffe	,,	1383
Boadicea revolts from Rome	,,	62
Book of common prayer established	,,	1552
Bourges Cathedral commenced	,,	1280
Bow pottery established	,,	1730
Bristol pottery commenced	,,	1776
Britain, Arabic numerals first used ... ... c.	,,	1131
Britain, Romans leave	,,	426
British Association founded...	,,	1831
Burslem pottery established...	,,	1670

C.

Cambyses begins his reign	B.C.	525
Carthaginians trade with Britain	,,	460
Celts occupy Gaul and Britain	,,	620
Cotton cultivation flourishes in Egypt	,,	301
Cyrus begins his reign	,,	560
Cyrus takes Babylon...	,,	556
Cairo built	A.D.	974
Carmelites established in England	,,	1240
Carthusians ,, ,, ...	,,	1180
* Cathedral, Amiens, commenced	,,	1220
,, Bangor ,, ...	,,	1509
,, Bourges ,, ...	,,	1280
,, Canterbury ,, ...	,,	1096

* Note.—In all these cases the date given is that of the commencement of the historic building, though in many cases tradition speaks of an earlier building on the same spot. In many cases too the date given is but a very small part of the whole, thus to take the case of Canterbury, begun in 1096, a portion of the nave and north transept were not completed till 1411, while the Lady Chapel was not finished till 1468. A period of almost 400 years.

Cathedral Carlisle commenced	... ...	A.D.	1092
„ Chichester „	... ...	„	1190
„ Cologne „	... ...	„	1248
„ Durham „	... ...	„	1093
„ Elgin „	... ...	„	1224
„ Ely „	... ...	„	1321
„ Exeter „	... ...	„	1279
„ Florence „	... ...	„	1298
„ Glasgow „	... ...	„	1242
„ Gloucester „	... ...	„	1807
„ Lichfield „	... ...	„	1310
„ Lincoln „	... .	„	1087
„ Manchester „	... ...	„	1422
„ Messina „	... ...	„	1296
„ Milan „	... ...	„	1386
„ Norwich „	.. ..	„	1096
„ Nôtre Dame, Paris	... ...	„	1163
„ Oxford ...	... ...	„	1160
„ Peterborough	... ...	„	1117
„ Rhiems ...	... ...	„	1211
„ Rochester ...	... ...	„	1115
„ Rouen commenced	... ...	„	1207
„ Salisbury „	... ...	„	1220
„ Sens „	... ...	„	1143
„ St. Ouen „	... ...	„	1319
„ Strasbourg „	... ...	„	1277
„ Ulm „	... ...	„	1377
„ Upsal „	... ...	„	1287
„ Wells „	... ...	„	1225
„ Winchester „	... ...	„	1079
„ Worcester „	... ...	„	1094
„ York „	... ...	„	1227
Caxton born	... ...	„	1410
Caxton's press established at Westminster		... „	1471
Chaucer born	... ...	... „	1328
Chelsea pottery established ...	... ...	... c. „	1690
Chemical Society of London founded		... ... „	1841
Chertsey Abbey founded ...	... ...	... „	666
Chinese porcelain first brought to Europe		... „	1518
Cistercians established in England...		... ... „	1128
Coalbrookdale pottery established ...		... ... „	1756

Coliseum founded by Vespasian	A.D.	72
Coliseum completed by Titus	,,	80
Constantinople captured by the Turks	,,	1453
Cordova, Emirate founded	,,	755
Cordova, mosque commenced	,,	786
Cranmer's bible printed	,,	1540
Crutched Friars established in England	,,	1244

D.

Darius begins his reign	B.C.	522
Darius builds palace at Persepolis	,,	521
Devambara builds central palace at Nimroud ...	c. ,,	870
Damascus, mosque at, commenced	A.D.	705
Da Vinci, Leonardo, born 1452, died	,,	1519
Delft, pottery commenced	,,	1310
Derby ,, ,, ...	,,	1748
Devizes Castle built	,,	1103
Division of Roman empire	,,	395
Dominicans established in England	,,	1220
Doomsday book compiled	,,	1080
Ducal palace, Venice	,,	1350
Durer, Albert, born 1471, died	,,	1528
Durham Cathedral commenced	,,	1093

E.

Eagle adopted as Standard by the Romans ...	B.C.	102
Earthenware used at Rome	,,	747
Egypt conquered by Augustus Cæsar	,,	38
Erechtheium built, Athens...	,,	409
Esarhaddon builds S. W. palace Nimroud ...	,,	690
Egbert, king of all England	A.D.	828
Eleanor crosses built	,,	1291
Elgin Cathedral commenced	,,	1224
Ely ,, ,, ...	,,	1321
Excavation of Nineveh ruins begun	,,	1842

F.

First invasion of Britain by the Romans	B.C.	55
Flint glass made in England	A.D.	1557
Florence Cathedral began	,,	1298
Fountains Abbey ,, ...	,,	1132
France, manufacture of majolica introduced ...	,,	1590
Franciscans established in England	,,	1224
Furness Abbey began	,,	1127

G.

Gaul, Celts occupy it	B.C.	620
Greece, introduction of letters ... ...c.	„	1550
Geographical Society founded	A.D.	1830
Geological „ „	„	1807
Glasgow Cathedral commenced	„	1242
Glass introduced into England	„	674
Glass used for windows in England	„	1180
Glazed tiles introduced into Spain by the Moors...	„	711
Gloucester Cathedral commenced	„	1089
Gold first coined in England	„	1216
Granada, conquest of, by the Moors	„	1492
Great fire of London	„	1666
Guildford Castle built	„	1066

H.

Herodotus, historian, born	B.C.	484
Hegira of Mahomet	A.D.	622
Heraldry introduced into England	„	1192
Hunterian Society founded	„	1819

I.

Invasion first, of Britain by the Romans	B.C.	55
Ireland colonised by the Phœnicians	„	1800
Italy, introduction of letters	„	1250
Inquisition established in France	A.D.	1208
Inquisition established in Spain	„	1229
Invasion of Spain by the Moors	„	711

J.

Jeremiah refers to the potter's art	B.C.	605
Jerusalem taken by the Turks	A.D.	1065
Jerusalem taken by the Crusaders	„	1099

K.

Khorsabad, Sargon builds temple at	B.C.	722
Kyonjik, place built by Sennacherib	„	703
Kelso Abbey began...	A.D.	1128
Kenilworth Castle „	„	1120
Khorsabad, excavations commenced	„	1843
King John grants charter to Marlborough... ...	„	1204
Kirkstal Abbey commenced...	„	1152
Knights Hospitallers established in England ...	„	1108
Knights Templars „ „ „ ...	„	1130
Koran compiled	„	634

L.

Lambeth, plate glass works	A.D.	1673
Layard commences excavations at Nineveh ...	,,	1845
Lichfield Cathedral commenced	,,	1310
Linnæan Society of London founded	,,	1788
Liverpool pottery established	,,	1674
Lucca Della Robbia, born 1399, died	,,	1481

M.

Mahomet proclaimed prophet	A.D.	609
Mahomet, born 571, died	,,	632
Majolica introduced into Germany	,,	1503
Manchester Cathedral commenced	,,	1422
Manufacture of Majolica in France...	,,	1590
Manufacture of pottery at Delft	,,	1310
Marlborough Castle commenced	,,	1087
Marlborough College opened, August	,,	1843
Melrose Abbey commenced	,,	1327
Messina Cathedral ,, ...	,,	1296
Meteorological Society founded	,,	1821
Milan Cathedral commenced	,,	1386
Missal compiled	,,	1080
Monasteries suppressed	,,	1538
Moors conquer Spain...	,,	711
Moors driven out of Spain	,,	1491
Mosque of Amrou, Cairo, began	,,	642
,, Cordova ,, ...	,,	786
,, Damascus ,, ...	,,	705
,, Omar, Jerusalem ,, ...	,,	637
,, Teyloun, Cairo ,, ...	,,	876

N.

Nebuchadnezzar builds Babylon	B.C.	600
Nimroud, central palace, built by Devambara ...	c. ,,	870
Nimroud, N.W. palace, built by Ashurakbal ...	c. ,,	900
Nimroud, S.W. palace, built by Esarhaddon ...	,,	690
Nineveh destroyed	c. ,,	600
Nineveh founded by Ninus	c. ,,	2147
Netley Abbey commenced	A.D.	1239
Nineveh ruins first excavated	,,	1842
Norwich Cathedral commenced	,,	1096
Nottingham Castle commenced	,,	1075
Notre Dame, Paris ,, ...	,,	1163

O.

Oldest sepulchral brass in England...	A.D.		1277
Omar, Jerusalem, Mosque of, began	,,		637
Oxford Castle, began...	,,		1071
Oxford Cathedral ,, ...	,,		1160

P.

Painting introduced at Rome	B.C.		289
Parthenon built	,,		444
Persepolis destroyed by Alexander	,,		332
Phidias, Sculptor, died	,,		432
Phœnicians colonise Ireland...	,,		1800
Polygnotus, painter, flourishes	,,		435
Porcelain first made in China	c.	,,	185
,, Japan...	c.	,,	27
Pottery referred to by Jeremiah	,,		606
Palissy born, A.D. 1510, died	A.D.		1589
Palissy ware first made	,,		1555
Paper first made from rags	c.	,,	1300
Parthenon marbles acquired by England	,,		1816
Peterborough Cathedral began	,,		1117
Philological Society founded	,,		1842
Picts and Scots harass England	,,		427
* Pisa, (leaning) tower built	,,		1174
Pisans capture Majorca	,,		1115
Plate glass made at Lambeth	,,		1673
Pliny, death of	,,		79
Pompeii destroyed	,,		79
Pottery, Belleek, commenced	,,		1857
,, Bow	,,		1730
,, Bristol	,,		1776
,, Chelsea	c.	,,	1690
,, Coalbrookdale	,,		1756
,, Derby	,,		1748
,, Liverpool	,,		1674
,, Plymouth	,,		1705
,, Worcester	,,		1751

R.

Rome founded	B.C.		753
Rosetta stone carved...	,,		196

* Erected as an upright tower: the unequal subsidence of its foundations has caused it to lean to one side.

Raffaelle, born A.D. 1482, died	A.D.	1520
Raglan Castle commenced	„	1135
Ravenna, capital of Roman Empire	„	404
Reading Abbey founded	„	1121
Rhiems Cathedral commenced	„	1211
Rievaulx Abbey founded	„	1131
Rochester Cathedral commenced	„	1115
Roman Empire, division of	„	395
Roman Empire, Western, fall of	„	476
Roman Empire, Eastern, fall of	„	1453
Rome plundered by the Vandals	„	455
Rome sacked by Alaric the Goth	„	410
Royal Society founded	„	1660

S.

Samos built	B.C.	986
Scopas, Sculptor, flourishes	„	349
Second Roman invasion of Britain	„	54
Susa destroyed by Alexander	„	332
Salisbury Cathedral commenced	A.D.	1220
Samos under Romans	„	78
Sanction of Images, Council of Nice	„	787
Seal first met with on Charter	„	1041
Seus Cathedral commenced	„	1143
Severus, wall of	„	210
Sèvres pottery established	„	1695
Southwell Minster commenced	„	1233
Spain conquered by the Moors	„	711
Spain regains possession of Granada	„	1491
St. Alban's Abbey commenced	„	1077
St. Ouen, Rouen, commenced	„	1319
Strasbourg Cathedral commenced	„	1277

T.

Tin exported from Britain	B.C.	460
Temple Church, London, commenced	A.D.	1185
Tewkesbury Abbey founded...	„	1103
Thermæ of Caracalla...	„	212
Tower of London commenced	„	1078
Trajan's Column erected	„	114
Turks established in Europe...	„	1357

U

Ulm Cathedral commenced	A.D.	1377
Upsal Cathedral commenced	„	1287

V.

Vandals plunder Rome	A.D.	455
Venice, Ducal Palace commenced	„	1350
Vespasian commences Coliseum	„	72

W.

Warwick Castle commenced...	A.D.	913
Wedgwood, born 1730, died...	„	1795
Wells Cathedral commenced...	„	1225
Westminster Abbey commenced	„	1041
Westminster Hall	„	1097
Wickliff translates the Bible	„	1383
William of Wykeham born 1324, died	„	4140
Winchester Cathedral commenced	„	1079
Worcester Pottery established	„	1751
Wren, Sir Christopher, died...	„	1723

Z.

Zeuxis, Painter, flourishes	B.C.	396
Zoological Society of London formed	A.D.	1826

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